THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., JANUARY 30, 1890.

THE WEEK IN IRON CIRCLES.

General Features. The financial skies are generally clear, and money is quite easy. The railroads are well employed, and their earnings show a considerable increase. The demand for steel rails is active, and some large concerns are increasing their capacity. An estimate is going the rounds of the trade that Andrew Carnegie will clear $7,000,000 upon his works this year. The associated manufacturers had contracted, up to January 1, for the delivery in 1890 of 746,895 tons. Last year's deliveries were 1,271,438 tons, and it is expected that this year's business will equal it. In Western markets, a very active demand for finished iron and material for car-building, architectural work, agricultural machinery work and general machinery work is maintained. Jobbers are beginning to shade prices on nails and barb wire. A fair demand for plate and structural iron continues, as well as for spiegel, ferro manganese and billets. Steel rails are quoted strong at $35@$36 in Eastern markets, and $37 in Western. The repairing and side track requirements of railroad companies are increasing to such an extent that the restricted new mileage needs do not seriously affect the demand for new rails. The iron trade continues strong, and the important features heretofore referred to remain unchanged, the only exception being pig iron, as elsewhere stated. For the present at least it is a stand-off between buyers and sellers in nearly all branches of the pig iron trade at Cincinnati. Since the opening of the year a feeling of timidity and hesitation has developed all through the West, and buyers have generally concluded to see how long they can defer purchase with the object of breaking prices. Furnaces, on the other hand, are firm in their position, being in the main heavily sold and believing the situation to be intrinsically strong. With the heavy advance in coke, ore, freights and labor it is maintained that prices cannot decline much without cutting to the quick. Shipments are going forward very heavily on old orders, and foundries and mills continue in the main as busy as ever, though complaints are heard of falling off in enquiries for new business. "While the inquiries and transactions forces us to believe," write Wm. F. Jarvis & Co., Detroit, "that the iron market must at least remain firm, yet we have to report that in spots it is unquestionably weak. Particularly may this be said of Bessemer. We think without doubt the weakness shown is attributable in a large measure to speculators being forced to realize. However, in certain sections full prices have been obtained for Lake Superior charcoal, and some of the largest stocks have been reduced, as the large inquiries which we last week reported, have resulted in several good-sized transactions. While we reduce our quotations to agree with the current weakness shown, we beg to say that prices are largely variable, owing to the different conditions more or less effecting each particular transaction. The lowest quotations would probably apply to prompt delivery, while the highest figures must be paid for delivery covering any number of months at all. There has been almost an absolute dearth of ordinary foundry trade during the past week." A flourishing car-load business is in progress at Chicago, with an occasional sizeable order rounded up. Generally, however, the market is quiet, prices remain firm, and in one particular, at least, the tendency is still toward further advance. This is especially true of Lake Superior charcoal, which is in diminishing supply and increasing demand. A very open Winter in the woods has materially curtailed coaling operations. There is a good demand for Ohio softeners, but in small lots. Southern irons cut but little figure, being held at too high prices. Sales have increased in volume and in number of transactions at Louisville; quantities varied from car loads up to 1,000-ton lots, mostly for deliveries during the next sixty to ninety days. The transactions comprise various grades of both charcoal and coke metals. Prices, as a rule, have been well maintained, with the exception of a few small outside lots which are reported placed at some concessions from the current figures. It is known that in the near future some prominent concerns will require some further round quantities of iron, and there is enough of this kind of business in sight to give a hopeful feeling of the near future course of the market. There is no appreciable change in the St. Louis market, operations being limited to small lots. Furnaces continue very firm in their views, and it appears likely that the present lull will soon be followed by a period of greater activity, as buyers become convinced that nothing is to be gained by waiting.

Iron Ore. From the nature of the business thus far transacted, iron ore news, for the next six months, must prove rather dull as far as relates to sales. While there may be a million or more of non-Bessemer ores still unsold, its eventual disposition will play no figure in the market, and even that will be gone within a a month. There is, however, a growing sentiment in favor of new investments, and what formerly was to large extent speculative mining, will soon be a thing unknown in the Lake Superior country. One by one the large properties are being secured as investment properties, the last one being Section 33, purchased, or about to be purchased, by the Schlesinger syndicate. Section 33 is a high grade Gogebic Bessemer hematite, carrying 64 per cent. iron and averaging .040 in phos. The 1889 product was 73,370 tons, and the estimate for 1890 calls for 110,000 tons. The capital stock of the mine consists of 20,000 shares, of which 16,000 are known to have been offered at $15, making the price of the entire stock $300,000. At this writing no authoritative news as to the conclusion of the sale is to be had, but it is believed the transaction was closed a week ago, and will hold.

Pig Iron. While the sales are very light, prices are firm and the number of inquiries have largely increased. It is safe to forecast a large and active buying movement toward the middle of February, as by that time most of the consumers of foundry and forge pig will be compelled to enter the market. All this, of course, is predicated upon a settlement of the coke question. Although all the furnaces have been taking in coke to the full limit of their storing capacity, most of them would have to shut down in the event of a general strike, and at short notice. The coke producers are making a good profit at present prices and, it is thought, will not decline some sort of a compromise with their workmen. The pig stocks reported to the Western Pig Iron Association show a considerable increase during January, there being about 240,000 tons of iron now on hand, or 50,000 more than in November.

Merchant Iron. The trade reports a very good business and at profitable prices. Bar iron sells freely in 500 and 1,000-ton lots, at prices closely approximating $2 at the mill, and sheet iron is stiffening up all the time. Gas pipe has advanced during the week, reporting the closest discount in a year. Boiler iron has gone up ten cents and cut nails are advancing.

Scrap Iron. Old American rails are a trifle off, owing to over supply. They are offered at $27.75, but can be bought for $27.50. The demand for wrought scrap continues, but car wheels are weak and dull.

Hardware. The jobbers are preparing for a large Spring trade, which seems to increase with the advance in prices. Almost every hardware staple has been marked up, and further advances are expected by March 1. Metals are quite firm.

A GREAT INDUSTRIAL EMPIRE.

In his argument before the Congressional Committee on the World's Fair Site, Mr. E. T. Jeffrey grouped together, in almost startling figures, the elements of greatness claimed by the Central Western States. Taking the nine States of Ohio, Indiana, Kentucky, Illinois, Iowa, Missouri, Michigan, Minnesota and Wisconsin, the significant fact was adduced that their area is 13 per cent. of the area of the United States, the population is 35 per cent., the railway mileage 37 per cent., the wheat crop 51 per cent., the corn crop 57 per cent., the oat crop 60 per cent., the output of bituminous coal 40 per cent. and the production of pig iron (in 1888) 30 per cent. The following table shows the aggregate area, population and railway mileage:

States.	Area.	Estimated population, 1892.	Railroad mileage (Poor's Manual).	
			1860.	1888.
	Sq. miles.		Miles.	Miles.
Ohio	39,972	3,900,000	2,946	7,683
Illinois	55,414	3,900,000	2,790	9,904
Indiana	33,809	2,400,000	2,163	5,912
Iowa	55,045	2,000,000	635	8,366
Kentucky	37,690	2,000,000	534	2,596
Missouri	63,370	2,750,000	817	5,728
Michigan	56,451	2,200,000	779	6,789
Minnesota	83,531	1,600,000	.....	5,366
Wisconsin	53,924	1,857,000	905	5,436
Total	481,196	22,607,000	11,569	*57,780
Total United States	3,581,385	65,000,000	.....	157,000
Percentage in nine States	13	35	.....	37

*An increase of 46,211 miles in twenty eight years.

In the subjoined table is given the coal and pig iron production:

COAL AND IRON.

[Coal, ton 2,240 pounds; pig iron, ton 2,000 pounds.]

State.	Bituminous coal output. 1887.	Pig iron, 1888.
	Tons.	Tons.
Ohio	9,197,954	1,103,818
Illinois	9,177,580	579,307
Indiana	2,872,958	15,260
Iowa	3,994,489	.....
Kentucky	1,726,058	56,790
Missouri	2,865,996	91,783
Michigan	63,804	213,251
Minnesota	.....	.....
Wisconsin	.....	116,037
Total nine States	29,898,839	2,176 246
Total United States	75,416,964	7,268,507
Percentage in nine States	40	30

Still another evidence of substantial prosperity is the fact that the debts of these States is only 12 per cent. of all the total State debts in the Union. In fact, at least three, and possibly four, of these States have no debt at all. We doubt if any similar group can be found in the United States that will compare with these in all that is essential to prosperity. It is a splendid argument of substantial prosperity, not so much in favor of Chicago as the site of the World's Fair, as for the pre-eminence of the great States which constitute this great central industrial empire.

THE IRON ROOFING INDUSTRY.

The National Iron Roofers' Association, whose headquarters are in Cincinnati, have also sent out circulars about the coming bill in Congress. They are addressed to the Senate and House of Representatives, Washington. In the circular it is stated:

Iron roofing and siding consumes about 50,000 tons, or about one-third of the sheet iron made in the United States. This represents a productive value of $4,000,000. If tin-plates are admitted free of duty, this industry will be destroyed. The sheet mills will lose that much of their product from this source alone, and the wage earner $1,500,000 from the pig to the finished product of roofing and siding. Free tin-plates would transfer the manufacture of all iron and steel products to Europe, and stop our sheet mills in their present production of 150,000 tons sheet iron and sheet steel, as follows: 50,000 tons for roofing purposes, 50,000 for galvanizing, and 50,000 tons that enter into consumption as stove pipes, coal hods, bread pans, and all the higher grades of sheet iron used for various purposes. Sheet iron and sheet steel coated with the thinnest possible covering of tin or terne (part lead and part tin) will flood our markets, and displace the domestic article.

The census (1880) gives $305 as the average of wages to each person. According to that the wages on the sheet metal from the pig to the finished roofing and siding being $1,500,000, gives employment to 5,000 people. Edward Atkinson's theory on the same giving labor $3,600,000, as stated, would employ about 11,000 persons. In the total production of the sheet mills of 150,000 tons, including the combined dependent industries named, the wages received aggregating $6,000,000 from the pig at $305 a head, would employ nearly 20,000 persons. According to Mr. Atkinson's estimate from the raw materials in nature's bed to the finished products aggregating $10,650,000 labor production, about 35,000 laborers would be employed.

The location of tinned plate mills in the coal, iron and natural gas centers would conjoin deliveries in close proximity to the consumer, at a saving in millions in freights which now necessarily occur from Liverpool to the interior. Pittsburgh, Wheeling, Cleveland, Toledo, Chicago, St. Louis, Cincinnati, Indianapolis, Louisville, Nashville, Chattanooga, Birmingham, Anniston, Decatur and other Southern and Western points would equalize with the East in the manufacture of tin-plates, each mutually receiving a share in the distribution of more than 100 mills of two trains each.

The measure for the increase of the duty on tinned plate to 2½ cents will be pressed before Congress with vigor, and the probabilities are that it will pass. Besides looking after this most important piece of legislation, the association adopted very complete rules for measuring iron roofing, and declared that the Birmingham wire gauge would be its standard hereafter.

PROOF FOR A DOUBTING THOMAS.

The Chattanooga *Tradesman* asks for proof that the New York Metal Exchange and the American Pig Iron Warrant Company have "joined hands in the attempted manipulation of the pig iron market." We cheerfully comply by referring the *Tradesman* to *The Iron Trade Review* of October 10, 1889, wherein appears a letter to this paper from Mr. E. L. Shriver, Secretary of the New York Metal Exchange. In his letter, Mr. Shriver, referring to the subject of pig iron speculation, says: "We make no bones of the fact that the chief object of the Metal Exchange is to systematize, and, *so far as possible, foster speculation.*" We also refer to sundry circular letters and documents sent out jointly by the two organizations named, in September and later on, announcing the rules governing speculation in pig iron warrants. These documents were, no doubt, sent to the *Tradesman* at the time, so that its ignorance, real or professed, regarding the matter, is not reassuring as to its candor or fairness. That the purpose of the two bodies was well understood, both at home and abroad, is evident from the comments of the English papers, one of which, quoting from Mr. Shriver's letter, above referred to, criticized his position by saying that fostering speculation is outside of the province of exchange committees and injurious to trade, instancing similar manipulations of the London metal markets which resulted most disastrously. That this "unholy alliance" has as yet not had a more baleful influence upon the iron trade is due simply to the favorable condition of the market, not because the Metal Exchange and its ally have left undone anything that will "promote speculation;" so that the *Tradesman's* dream of such a speculative scheme, "honestly conducted," is not likely ever to be realized. The millenium is not quite here yet.

THE PROPOSED VAPOR STOVE CONSOLIDATION.

Considerable progress seems to have been made within the past two weeks toward a consolidation of the leading vapor stove concerns of the country. The companies upon which options have been obtained are reported to be as follows: The Schneider & Trenkamp Company, the Standard Lighting Company, National Vapor Stove and Manufacturing Company, the Lyman Vapor Stove Company, the Aurora Vapor Stove Company and the Consolidated Vapor Stove Company, all of Cleveland; the Adams and Westlake Manufacturing Company and the George M. Clark Company, of Chicago; the Quick Meal Vapor Stove Company and the Twin Burner Vapor Stove Company, of St. Louis, Mo. As to the two Chicago companies, denial is made that they have given options, but from information at hand, there does not seem to be any doubt that at least all of the Cleveland establishments are in the deal.

The proposed joint organization will be known as the United Vapor Stove Company, and it will be incorporated under the laws of Illinois, with a capital of $2,000,000. The main object of the consolidated company will be to reduce managing expenses, as well as manufacturing costs, so as to bring down selling prices to the level of the great mass of buyers. The vapor stove industry has attained large proportions in this country, and it looks as if the manufacturers were on the track of greatly extending its operations.

THE Philadelphia *Record's* only reply to Hon. George H. Ely's recent article in *The Iron Trade Review*, in support of the duty on iron ore, is this:

Mr. George H. Ely, President of the Western Iron Ore Association, has the hardihood to insist on the retention of the duty on iron ore because it is in the interest of labor. This argument rests on a basis of either stupidity or dishonesty. The ore diggers in Pennsylvania do not get an average wage of $1 per day. The ore-diggers in all parts of the country only get the going rate for their labor, without reference to the tariff. But the bulk of labor in converting iron ore into iron is expended upon it after the ore has been brought to the furnace; and it follows from this that to cheapen by any means the ore supply is to increase the fund from which labor is paid, and to make more employment for labor by widening the market for its product. Whilst the tariff on ore does not raise the wages of our ore-diggers, it contributes to depress the wages and lessen the employment of all the thousands who take

the ore and make it into iron and steel, and who convert the iron and steel into the mayriad useful shapes in which the metal enters into the final consumption.

Does the editor of the *Record* believe that "ore-diggers in all parts of the country only get the going rate for their labor, without reference to the tariff?" What, then, is the "going rate" of Cuban laborers, and what would be the effect upon home wages were Cuban ore admitted free, in competition with domestic ores, mined on a much higher scale of wages? And what about the vast transportation interests that depend upon the iron mining industry for their business and their wages? The *Record* is an adept at ignoring plain facts.

A MILWAUKEE paper states, as a matter of news, that that city is slowly but surely dropping out of the iron business and that all of the big mines will eventually move their headquarters to Cleveland. That is no news. There is not a Lake Superior mining company of any importance but has its headquarters at Cleveland.

IF surface indications are not at fault, the extensive plant of the Cleveland Rolling Mill Company, including its steel works, mines and steamships, may soon pass into the hands of a foreign syndicate.

FOREIGN investors, it is said, have lately turned their eyes upon some of the extensive steamship lines of the lower lakes.

A Wonderful Light.

If the invention of W. J. Norton, of Pittsburgh, fulfills its promises, there is a dangerous rival of the electric light in the field, if not to petroleum. He has invented what is alleged to be the cheapest light ever known, and yet "a light as intense and as accurate in its illuminations of colors as the sun at noonday." It is claimed that 500-candle-power light of the kind in question can be run at the nominal cost of one cent an hour. Mr. Norton has for years been engaged in developing this light. The undertaking has been very quietly conducted. Recently he permitted a few capitalists from Beaver county to witness experiments with his device. These tests proved so successful that a temporary and private company was soon formed to patent and develop the brilliant idea. The light in question is essentially a chemical discovery rather than a mechanical idea, and consists of a peculiar tape that is fed by a simple clock work. While it is peculiarly adapted to street or other stationary purposes of illuminations, yet it is said to be also applicable to portable or hand lamps; and in point of intensity it is not surpassed by electricity, its light is much softer, and far easier to the eyes. It feeds itself, requires neither pipes, wires or other connections, and in size may be produced from 300 to 7,000 candle-power. It is absolutely non-explosive, emits no smoke or objectionable vapor, is applicable to any purpose, and can be handled with as equal safety by a child as by an adult.—[Sharpsville Advertiser.

Benner's Prophecies.

In Farmer Benner's prophecies published some years ago, and which heretofore have proved close to results, the following occurs:

"I predict that the price of iron will advance, and the average price for the year 1889 will be higher than the average for 1888; and I also predict that there will be a wonderful advance in prices for iron stocks and all products and commodities in 1890. All business will be prosperous, and it will be a year of good crops and the boom year in this period of activity. In the beginning of the year 1891 speculation will be at its height—a great business inflation—pig iron $50 per ton in the markets of our country.

"I predict that there will be a panic in the year 1891. The overtrading and general inflation of business and expansion of credit and confidence will produce this result. The panic probably will be brought about by the effects of heavy rainfalls and floods, or by the collapse of some large financial business firms. This panic will be a commercial and financial revulsion, and will be followed by a long down sweep of prices."

The Armor Tests.

The plates to be used in the competitive trials for armor are to be six feet by eight feet, and ten and a half inches thick. Notice of intention to compete must be sent to the Navy Department by the 10th of next month, and the plates for trial must be delivered within three months of that date. The face of the plates is to be divided by horizontal and vertical lines into squares one foot square. Five chrome steel piercing projectiles, weighing 100 pounds each, are to be fired from a six-inch steel breech-loading rifle against each plate, with a striking velocity of about 2,113 feet per second. Representatives from competing firms are not to be allowed to witness the tests of any other plate than their own, nor to see the official record made as to other plates. The results of all the trials will be made public after the tests are completed.

Chignecto Ship Railway.

This railway, which is to afford sea-going vessels a short means of communication between the Gulf of St. Lawrence and the Bay of Fundy, is progressing rapidly towards completion, and it is expected to be in operation in about two years. Twelve hundred men are employed on the works. Vessels will steam or sail up to dock at either end of the railway, will be raised in a cradle to the level of the rails, and will then be carried at the rate of eight or ten miles an hour to the opposite terminus, where they will be returned to the water.

OUR PRODUCTION OF PIG IRON IN 1889.

In its issue of January 22 the *Bulletin* of the American Iron and Steel Association presents to its readers complete statistics of the production of pig iron of the United States in 1889. The total production of pig iron in the United States in 1889 was 7,604,525 gross tons, against 6,489,738 gross tons in 1888, an increase of 1,114,787 gross tons, or over 17 per cent. Reducing gross to net tons, our production in 1889 was 8,517,068 net tons, against 7,26 ,507 net tons in 1888. When it is remembered that our production in 1888 was the largest in our history down to that time the magnitude of our production in 1889 will be more fully comprehended.

The enormous production of 1889 was better distributed throughout the year than the public has been erroneously led to believe. The production of the first half of 1889 was 3,662,486 gross tons, and the production of the second half was 3,942,039 gross tons, an increase in the last half of 279,553 gross tons The increased production in the second half of 1889 was wholly due to the increased demand for Bessemer pig iron.

The stocks of pig iron which were unsold in the hands of makers or their agents on the 31st of December last, and which were not intended for the consumption of the manufacturers, amounted to only 277,401 net tons, against 336,161 net tons at the close of 1888. There was, however, an increase in stocks during the first half of 1889, the figures on the 30th of June amounting to 563,-286 net tons. There was, therefore, a considerable decrease in stocks in the last half of the year. In addition to the stocks above noted, the American Pig Iron Storage Warrant Co., advises the Association that at the close of 1889 there were 36,200 gross tons, or 40,544 net tons, of pig iron in its warrant yards.

The production of pig iron in 1889 according to the fuel used was as follows compared with the production of the two preceding years:

Fuel—Net tons.	1887.	1888.	1889.
Bituminous	4,270,635	4,743,989	5,952,414
Anthracite and coke	1,919,640	1,648,214	1,575,996
Anthracite alone	418,749	277,515	344,358
Charcoal	578,182	598,789	644,300

Nearly all the leading pig-iron producing States shared in the increased production of 1889 over 1888. Pennsylvania shows the largest actual gain, with Alabama next, Pennsylvania's increase over 1888 being 592,056 net tons and Alabama's 341,933 tons. The great progress made by the entire South in the production of pig iron in the last four years is shown in the following table:

States—Net tons.	1886.	1887.	1888.	1889.
Alabama	283,859	292,762	449,492	791,425
Tennessee	199 165	250,344	267,931	294,655
Virginia	156,250	175,715	197,396	251,356
West Virginia	98,618	82,311	95,259	117,900
Kentucky	54,844	41,907	56,790	42,518
Georgia	46,450	40,947	39,397	27,559
Maryland	30,502	37,427	17,606	33,847
Texas	3,250	4,383	6,587	4,544
North Carolina	2,200	3,640	2,400	2,898
Total	875,179	929,436	1,132,858	1,566,702

There has been a gratifying increase in the production of spiegeleisen in 1889, the production being 86,812 net tons against 54,769 tons in 1888.

Much has been written about the possibilities of our overtaking Great Britain in 1890 in the production of pig iron. It has been assumed that we would certainly do this; indeed, that we are *now* producing at a more rapid rate than the mother country. The following comparative figures will throw some light on this subject:

Years—Gross tons.	Great Britain.	United States.
1882	8,586,680	4,623,323
1883	8,529,300	4,595,510
1884	7,811,727	4,597,868
1885	7,415,469	4,044,526
1886	7,009,754	5,683,329
1887	7,559 518	6,417,148
1888	7,998,969	6,489,738
1889 (estimated for Great Britain)	8,300,000	7,604,525

The *Bulletin* does not think that we will pass Great Britain in 1890 if trade conditions in both countries should continue as they now are. In 1889 we exceeded her production in 1887.

Locomotive Building in 1889.

Locomotive building has evidently not been quite as large in the year just ended as it was in the year preceding. The falling of in the product has not, however, been serious. In 1888 we reported 2,180 locomotives built by seventeen firms. In 1889 we find 1,870 built by sixteen firms. The product of the firms not reporting would probably not raise the output to 2,000. This is, of course, exclusive of engines built in railroad shops. Thirteen of the firms reported in both years. These built 1,794 locomotives in 1888 and 1,657 in 1889. It is quite evident, therefore, that there has been some falling off, but it was not enough to make dull times for the builders. Indeed, in the last quarter of the year they were generally very busy. The average yearly product of nineteen firms for the eight years 1881-88 was 1,645 locomotives, 215 less than the 1889 product of the sixteen firms now reporting. Only three of the thirteen firms whose reports we can compare for the last two years show an increased product in 1889 over 1888. All of the others show a falling of from 16 to 60 per cent. Although our returns of cars built in 1889 are not yet sufficiently complete for publication, it is apparent that the general course of that business has been like locomotive building. That is, there is a falling-off from the preceding year, but not a great one. Reports from about half the car-building companies show a decline of 20 per cent. from the product of 1888.—[National Locomotive and Car Builder.

THE keel of what will be the largest sailing vessel in the world has just been laid in one of the shipyards of the Clyde. She will be 9,600 tons, over 350 feet long, and will carry on her five masts a spread of canvas that would capsize Noah's ark.

RECENT PROGRESS IN ELECTRIC WELDING.

We publish in to-day's issue of the *Iron and Steel Trades Jorunal* a paper on "Electric Welding," read at a recent meeting of the American Institute of Engineers, by Mr. Woodbury, which is particularly interesting at the present time, when the process of electric welding is being exhibited in London. On Wednesday we had an opportunity of seeing the process in operation at the temporary works of the Electrical Welding Syndicate, in Fanshaw street, Hoxton, when we saw some splendid work done with marvelous rapidity. By this process copper wire can be perfectly welded, and, indeed, almost any metal can be joined together by means of electricity. We saw bars of iron and steel, tubes and various other forms of metals perfectly joined together in a few seconds of time, and from the subsequent tests of the pieces could have no doubt that the welding was as near perfect as possible, and that the strength of the material at the point of welding was as great, if not greater, than at any other part of the metal. The process is the invention of Professor Elihu Thomson, of the Thomson-Houston Co., of Boston, Mass.; and the works of the Thomson Electric Welding Co. are at Lynn, in the same State. In America the process has made great strides. At the Roebling Wire Rope Works, at Trenton, where the Brooklyn Bridge was manufactured, the electric welder has been in use for months, and 80,000 welds have been made without any failure. At the Trenton Iron Co.'s works the machine is used for welding wire rods, and the firm state that when drawing down welded rods, the few breakages occurring at the weld show that the joint is really stronger than the rod. The principle of the invention is the causing of currents of electricity to pass through the abutting ends of the pieces of metal which are to be welded, thereby generating heat at the point of contact, which also becomes the point of greatest resistance. At the moment of heating, mechanical pressure is applied to force the parts together. As the electric current heats the two pieces of metal to the welding temperature, the pressure follows up the softening surface until a complete union or weld is effected, and, as the heat is first developed in the interior of the parts to be welded, the interior of the joint is as efficiently united as the visible exterior. With such a method and apparatus, it is found possible to deal with not only the common kinds of iron and steel, but with metals which have heretofore resisted attempts at welding, and have had to be brazed or soldered. Pieces of such metals and alloys as wrought iron, silver, copper, brass, lead, tin, zinc, bronze, German silver, platinum, gold and even cast iron are not only welded in each other, but different metals can be welded one to another in many combinations, extending the applications of the process to the attainments of results heretofore impossible in metal working, while the tensile strength of the welds, as shown by mechanical tests, is equal to the very best welding by the ordinary system, and superior to it, because the risk of dirt and burning is avoided. The machines are generators of electricity, so constructed as to produce, in the most economical manner, the low-pressure currents found most suitable for the purpose They are of sizes and types adapted to the kind and scale of work, as well as to the nature and location of the power by which they are to be driven. They are built to take power from any source, either direct from a motor or from line shafting; to operate wherever placed, by producing directly from such power the necessary currents, or to be supplied by currents taken from a circuit, fed by suitable dynamos at a greater or less distance from the welding apparatus itself. Each machine is necessarily limited to one particular size of article to be welded, but is capable of welding various sizes within reasonable limits. The machines are so graded as to apply to various kinds of work, from the smallest wire to bars over three inches in diameter. For heavier work, such as car axles, shafting, etc., special forms of machines, adapted to the purpose, can be supplied, while by the use of specially adapted holders, applied to the standard forms of machines, various shapes and irregular sizes of metal pieces may be welded without difficulty. We have no doubt but that there is a great future for the utilization of electricity in the welding of metals, and we anticipate that the Thomson welding machine will come rapidly into general use in the iron, steel and engineering works of this country.—[London Iron and Steel Trades Journal.

GIGANTIC PROJECT TO BRIDGE THE NORTH RIVER.

Gustave Lindenthal, the eminent engineer and bridge builder, of Pittsburgh, Pa., says the Philadelphia *Record*, has completed plans for a suspension bridge across the Hudson river, between Hoboken and Fourteenth street, New York. Congress has been asked to grant to the North River Bridge Co. the right to span the river at this, its narrowest point. The plans of the bridge provide for a structure that shall have not less than six railroad tracks, and shall be constructed with a single span over the entire river, between the established pier lines in either State. This unbroken span will be 2,850 feet long, which will make it the largest bridge in the world. It is the length of the span which decides the size of the bridge, and not the length of the bridge itself, from an engineering standpoint. The bridge is to be built subject to the approval of the Secretary of War, and all persons, railroad and telegraph companies, desiring to use it, are to have equal rights.

Mr. Lindenthal says the structure is to be 150 feet above the water, 15 feet higher than the Brookly bridge. There was a time, said he, when it seemed as though the physical obstacles to the construction of such a span would be insurmountable, but they do not exist to-day. It can be built with as much assurance of success as the Brooklyn bridge, or the Firth bridge, now almost finished. The ribs of the bridge will consist of steel wire cables with bracings. These bracings will consist of the insertion into the cables of the stiffening trusses, which are usually independent of the cables. By the plan of insertion, the cables act as the cords, and form a curved stiffening frame or suspended stiffened arch ribs. These cables will be fifty feet apart. The two supporting trusses are only strained to full capacity when six trains meet. The material of the bridge will be steel and steel wires. There will be four cables, each four feet in diameter. The towers will be of open lattice construction, to present as small wind surface as possible.

In reference to cost, Mr. Lindenthal says that the company has the practical business guarantee of the men who have money to invest. He roughly estimates the cost of the bridge itself at $16,000,000, the approaches at $7,000,000 and the right of way at from $11,000,000 to $13,000,000. The Brooklyn bridge cost $5,000,000, and has a length, including anchorage, of 3,700 feet, while the Hudson River bridge will have a length, including anchorage, of 6,500 feet; weight of each anchorage, Brooklyn bridge, 60,000 tons; Hudson River bridge, 660,000 tons; length of middle span, Brooklyn bridge, 1,600 feet; Hudson River bridge, 2,850. Mr. Lindenthal says the structure can be completed within three or four years, actual working time.

DEATHS IN THE IRON TRADE.

McCurdy.—At Cleveland, January 8, Wm. H. McCurdy, a stockholder in the mills of Cartwright, McCurdy & Co., in Youngstown, O. He was also engaged in the Lake Superior iron trade.

Kelley.—At Washington, D. C., Wm. D. Kelley, of Philadelphia, Pa. He was the oldest member in continuous service in the U. S. House of Representatives, and was sometimes called "Pig Iron Kelley," by reason of his championing the protection of pig iron.

Swindell.—At Allegheny City, Pa., January 8, J. B. Swindell, general manager of the Swindell & Smythe Co., of Pittsburgh.

Westinghouse.—At Schenectady, N. Y., January 17, Jay Westinghouse, president of the Westinghouse Agricultural Works, at Schenectady.

Simcox.—At McKeesport, Pa., January 11, Samuel I. Simcox, boss roller of the National Rolling Mills.

Clemson.—At Middletown, N. Y., January 13, Wm. Clemson, Sr., of the Wheeler, Madden & Clemson Manufacturing Co., manufacturers of saws and steels.

Williams.—At Taunton, Mass., January 12, J. R. Williams, who was for a number of years a director and president of the Taunton Iron Works Co.

Boring Long Holes Through Solid Metal.

It is not unusual to bore holes from the solid up to between three and four inches in diameter and several feet in length. In the manufacture of the Hotchkiss gun the blank tube is finished, as far as its bore is concerned, by four operations. The first tool bores a hole from the solid clear through the blank, leaving only material enough to be taken out by the following tools sufficient to provide the necessary fine finish. The other tools finish the surface, and cut and finish the grooves of the rifling.

The tool doing the first boring is formed at its end, which constitutes, of course, the cutting part of the tool, with steps. The object of stepping the cutting end in this manner is to reduce the width of the chip so that it will pass freely through an angular groove made in the side of the tool and out at its opposite end. One side of the tool is provided with a recess, which is formed by cutting a rectangular groove, which is then covered by a cap piece. This forms a hole along one side of the tool. The other side of the tool is cut away in into a very obtuse V shape, which extends from the cutting head back the entire length of the tool as does the other channel. By means of a pump, oil is forced through the rectangular hole down to the apex of the tool, when it flows back through the angular groove, carrying with it the chips cut by the stepped edges of the cone. This has been found in practice to work admirably, no clogging of the chips causing any inconvenience whatever.—[Iron Age.

Steel as Structural Material.

In spite of all argument, steel is rapidly taking the place of iron as a structural material. This movement meets, of course, more opposition in the East than in the West, because the East is the more conservative, and for like reason, in Europe the progress of the change is slower still. Still, the great Machinery Hall of the Paris Exposition was a steel construction. In naval architecture, also, steel plates have nearly driven iron plates out of the field, and in the year 1888 the proportion of iron to steel used in ship-building on the Clyde was but 5½ per cent., while only two years before it was nearly 33 per cent. Rolled iron beams are undoubtedly more reliable than those of Bessemer steel, but the fact that the latter can be produced at a greater profit has led the manufacturers to force them upon the market to the exclusion of the former, and they have been successful in doing this to a large extent, because the word steel represents to most minds something superior to common iron. There is small probability, however, that iron will ever regain the advantage it has lost, as new processes for the improvement of the quality of mild steel are constantly being introduced; while the doing away, by the Bessemer process, of the laborious and costly puddling would enable the manufacturer to sell beams at a much lower price than the iron beams and still not impair his profit.—[Northwestern Architect.

THOSE who are at all skeptical about the skill and inventive genius of Americans, as compared with that of other countries, will do well to observe the fact recently brought out by discussion of the German patent laws in the Reichstag, where it was revealed that last year Germany granted only 3,921 patents, against England's 9,799 and United States, 20,420.

THE iron viaduct at Macome's Dam Bridge to supply water for Washington Heights will be 1,500 feot long and 60 feet wide, and the estimated cost is $303,000.

THE Clyde leads the world in ship-building. Twenty miles of water front is utilized in this industry. The Fairfield shipyard employs 4,000 men.

STEEL IN LOCOMOTIVE BOILERS.

We have often heard that there is an increase in the frequency of locomotive boiler explosions. Whether there is or not, they are too frequent so long as there are any at all. It is only a few days since that a boiler in a new locomotive exploded just after being put into service. The causes of the explosions are not the same in each case. One of the principal of them is an increase in pressure without necessary changes in design. In not a few cases where the pressure has been changed from 130 to 160 lbs. per square inch, the only change that has been made in the design is in the thickness of the sheets; the effect of the increased vibrations of the sheets due to an increase of pressure being lost sight of. Flat surfaces that will stand without fractures, due to repeated bending, as the pressure varies from below 130 lbs. up to that point, will not stand when the pressure is increased to 160 lbs., even if the plates are made thicker. One of the most disastrous explosions that occurred last year was that of a new locomotive boiler that was made of excellent steel, but whose shape was designed for pressures of 140 lbs. and under, and was not changed when used at 160 lbs., with increased thickness of the sheets.

Perhaps the deterioration of steel under repeated vibrations is too little understood and appreciated. When a locomotive crank pin breaks, showing excellent material, but giving no warning, those in charge of the equipment pronounce against steel as a material for such pins, while the truth may be that the bending to which the pin was subjected was greater than it could bear if often repeated. With iron there seems to be much less difficulty under a continual vibration, and because of this there are yet many able men who cling to it for axles and crank pins, and a few who will still have nothing else for boilers. There is no evidence that soft and tough steel will not stand as many repeated strains as iron, and in the case of stay-bolt steel there is no lack of experiments to show that the number of repeated vibrations through an arc of 120 degrees before fracture is considerably in excess of those that can be withstood by the best stay-bolt iron. However, when threads are cut on these bolts there is less advantage shown by the steel. Also there is little knowledge extant of the comparative action of iron and steel stay-bolt material when the vibrations are each within the ordinary limits of elasticity.

Boiler steel is not uniform—not even the output of the same mill—and common tests such as are performed on an anvil, are not sufficiently accurate to decide upon differences that are vital, and it is a realization of this fact that has led several railroad companies to critically examine each sheet used, even when purchased from reputable makers under a written guarantee. Two roads have lately, to our knowledge, selected many bad sheets from lots of steel supposed to be good, and which were purchased under conditions which were formerly deemed sufficient to warrant its use without particular examination. This is one of the lines of usefulness in which the mechanical testing laboratories return great advantages for small outlays of money; for it is surely an advantage to know that the steels in locomotive boilers are uniform.

So much for the character of the material; by following the practice of the best roads its uniformity is assured. In the nature of the designs more needs to be done. Too many flat-sided, insufficiently stayed boilers are in use. It is not enough to build a boiler that will stand 400 pounds per square inch under either a steam or water test—hot or cold—even if the working pressure is to be but 160 pounds, and it would not be enough if the boiler showed no leaks or did not give way under a 600 or 700-pound test. What is needed is that the shell is not distorted under those pressures, and who is there who makes a practice of testing the changes of shape under change of pressure? It is true that some experiments have been made in this direction and that the results have been such as to cause a few to insist upon the importance of such examinations, but the matter seems to have been dropped and lost sight of among the many other duties devolving upon the mechanical constructors of railroad equipment. Does it not appear to be, in view of the tendencies to still further increase pressures, important to make examinations to determine the changes of shape under pressure, particularly with flat-sided wagon-top boilers.—[Railroad Gazette.

SUBMARINE NAVIGATION.

A remarkable story of the successful trial trip of a new submarine boat called the Peral, the invention of a Spanish naval officer, is told in a letter from Valladolid, which appeared in the Rochester *Post-Express* of January 8. The story is so wonderful, so much in the vein of Jules Verne's vivid imagination, that it might well excite a feeling of incredulity but for the intrinsic evidence of truthfulness afforded by the matter and manner of the narrative. The writer enters into full and technical details of the trial trip, which is said to have taken place last month in the bay of Cadiz; and thus sums up the results of the demonstration:

"The Peral has remained seven hours completely without communication with the exterior, its occupants breathing the fresh air in the depositories. The Peral reached its dock at 5:40 P. M., being eight hours and forty minutes under proof. It navigated three hours and a half, submerged to the depth of three and a half meters, that is up to the windows of the optical tower, and in this position it has navigated with the needle and optical apparatus at the depth of three meters and eight decimeters. It navigated one and a half hours using the optical apparatus alone. It has run altogether thirty-five miles, beginning the proofs of submersion ten miles distant from Cadiz, a circumstance which, we must remember, did not occur with the French boats, Gaubet and Gimote, which made their experiments a few meters from their docks."

It is a little remarkable that we should not have heard more of this modern marvel by cable. But assuming the above report to be even approximately correct—and the enthusiasm of the Spanish temperament, in the first flush of success, admits of some margin—it is scarcely too much to say that the first trip of the Peral foreshadows a revolution in naval warfare almost as startling as that which was precipitated by the first appearance of the Monitor in Hampton Roads. If submarine navigation be an accomplished fact, in anything like the measure indicated by the statement quoted, it means good-by to the ponderous iron-clad navies of the world, the supersedure of all present notions respecting fortifications as coast defenses; in fact, it means that the making of war upon the sea will be so costly and so fatal that the great powers will be practically put under bonds to keep the peace on the ocean wave. How far the Peral will contribute to such a millenial outcome, however, can scarcely be judged at this time. But if half that has been said of this new craft be true, there should be further tidings of her before long, of the utmost importance to naval designers and constructors on this side of the ocean.—[Philadelphia Record.

WHAT INVENTION HAS DONE.

This is the manner a contemporary chronicles some of the doings of inventors:

In making bread-boxes, three workers can do the work of thirteen box-makers by the old methods.

In cutting out clothing and cloth caps with dies, one worker does the work of three by the old methods.

In leather manufacture, modern methods have reduced the necessary number of workers from five to fifty per cent.

A carpet-measuring and brushing machine, with one operator, will do the work of fifteen men by the old methods.

In the manufacture of flour, modern improvements save seventy-five per cent. of the manual labor that was once necessary.

In making tin cans, one man and a boy, with modern appliances, can do the work of ten workers by the old process.

By the use of coal-mining machines, 160 miners in a month can mine as much coal in the same time as 500 miners by the old methods.

One boy, by machinery, in turning wood work and materials for musical instruments, performs the work of twenty-five men by the old methods.

In the manufacture of boots and shoes, the work of 500 operatives is now done by 100, a displacement of wage-earners of fifty per cent. by aid of machinery.

In stave-dressing, 1,200 laborers, with a machine, can dress 12,000 staves in the same time that the same number of workers by hand could dress 2,500 staves.

In the cotton mills in the United States the manual labor has been reduced about 50 per cent. Now one weaver manages from two to ten looms, where one loom was formerly kept by one worker.

In the manufacture of brick, improved devices save one-tenth of the labor, and in the manufacturing of fire-brick, 40 per cent. of the manual labor is displaced.

In the manufacture of carriages, it used to take one man 30 days to make a carriage. It is now made by the aid of machinery with the work of one man in 12 days.

In the manufacture of agricultural implements, 600 operatives, with machinery, including 18 classes of wage-earners, do the work of 2,115 wage-earners without machinery, displacing 1,585 workers.

In the manufacture of wall paper, one worker by the aid of machinery, does the work of 100 workers by manual labor, and in cutting and drying paper by machinery, four men and six girls do the work of 100 operators by old methods.

In manufacturing gun stocks, one man by manual labor was able to turn and fit one gun stock in one day of 10 hours, while three men now, by a division of labor, and the use of machinery, can turn and fit 125 to 150 gun stocks in 10 hours. This displaces the work of 44 to 49 wage-workers.—[Patent Review.

A Quick Change of Large Engines.

Just what it means for an engine to be self-contained and shipped completely erected, tested and ready to put into operation is not always appreciated until practically illustrated. A recent occurrence at the Baldwin Locomotive Works proves this in a forcible way. The Hamilton street shop of that works has been operated for several years past (twenty-four hours a day) by a Westinghouse 200 H. P. standard engine, which is one of a dozen or more of the same kind in use in this extensive establishment. They have recently been replacing their larger engines with Westinghouse compounds for the purpose of gaining the greater economy due to the use of the latter. They recently had occasion to make a change from the 200 H. P. Standard Westinghouse to a 250 H. P. Westinghouse Compound, without stopping the works. The Standard engine ran the shop up until 6 o'clock, P. M., when it was stopped, disconnected, removed from the foundation; the 250 H. P. Compound was put in its place, connected up, pipes run, and was in operation at 3:30 A. M This is probably as quick a change as was ever made with engines of such a size.

That this is only possible with a self-contained engine, which can be completely erected and tested in the shop in which it is built, is evident, and even with the advantages offered by such an engine for quick erection, it is a smart job of work to perform in such a limited time. It is somewhat doubtful whether or not it could be performed at all by any concern, unless it, like the Baldwin Locomotive Works, has been able to make a record for itself of turning out a locomotive complete in seven days after the receipt of the order.

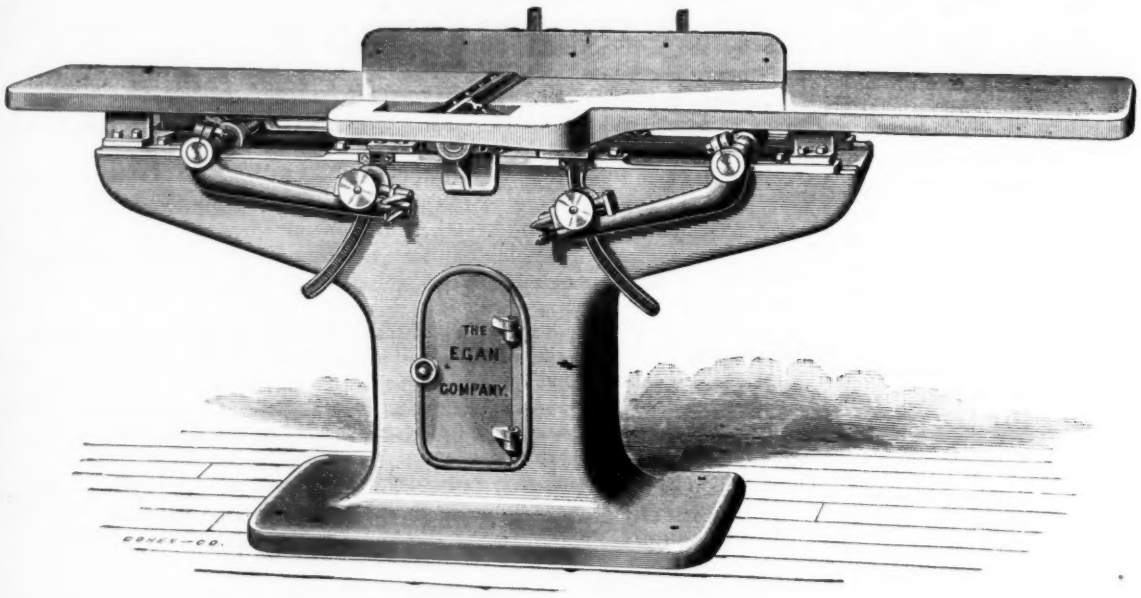
ONE of the leading iron-masters in Chicago, in the course of an interview with a newspaper reporter, expressed the opinion that in a few years' time the blast furnace property will be rendered worthless, as iron and steel will be produced direct from the ore.—[Iron & Steel Trades Journal.

AN Oldham (Eng.) machine works employs 8,000 hands.

NEW HAND PLANER AND JOINTER.

With this issue we introduce a new advertiser to our readers, whose line of late improved wood-working machines has no superior for quality or variety. The Egan Co. have taken the initiative with reference to that very useful machine known to all wood-workers as the hand planer, which they have so improved to that degree of perfection that it now has the highest efficiency yet attained in this class of machines. We give a representation of this new hand planer, and a description as follows:

This new hand planer and jointer has special advantages not usually found on machines of this class, and which will recommend it to practical wood-workers as being the most convenient machine made, doing a great variety of work, such as making glue joints (either concave or convex) planing out of wind, cornering, chamfering, beading, grooving, gaining rabbeting and a general run of work. The column is one complete casting, cored out, using the inside for a tool box. The top is planed perfectly true, giving a solid and reliable foundation for the incline plate to work on. The journal boxes for the cylinder are also part of the main column, insuring a steady running head. The tables are over seven feet long, planed perfectly true, having a rabetting table connected which supports the stock, either for cutting across or with the grain of the wood, using the long, straight knives for this purpose, thereby saving time and money. The cylinder is made of solid hammered steel. Two sides are made plain, to receive the long knives, and the other two sides slotted, for putting on beading, molding and any other shape of knife to suit the work to be done. This is a very convenient arrangement. The patent bevel fence is very simple in construction. One clamp, operated by a single screw, will hold the same to any desired angle. The face is planed perfectly true, and suitable provision is made for using the fence at any point across the table. The new arrangement for raising and lowering each table, independent of each other, is very complete. The tables can be raised or lowered the fullest extreme, instantly, to give access to the knives, or they can be adjusted the smallest fractional part of an inch to suit the work, all of which is accomplished by the two levers placed convenient to the operator. For further information and prices on this and other wood-working tools, address the Egan Co., Nos. 251 to 271 W. Front street, Cincinnati, O., U. S. A.



NEW HAND PLANER AND JOINTER.

IS THERE AN OVER-PRODUCTION OF LAKE SHIPPING?

Discussing the above subject, the Detroit *Free Press*, of recent date, says:

The *Free Press* has taken the pains to compile a comparative statement of the number and tonnage (gross) of steam vessels, schooners and barges (of 200 tons and upwards) engaged in the freighting trade of the lakes for the year 1879 and the year just passed. Here they are:

In 1879 the number of steam vessels in operation was 687; their total tonnage was 186,062 and their average tonnage 271. In 1889 there were 859 steam craft in commission, with a total tonnage of 523,599 and an average of 610.

In 1879 there were 1,560 steamers and barges in commission, with a total tonnage of 338,405 and an average of 217. In 1889 this number was decreased to 1,079, the total tonnage had decreased to 290,971, and the average tonnage had increased to 278.

In order to ascertain the carrying capacity of this fleet in the season of 1879, ten per cent. is added to the gross tonnage of steam vessels, which will give what the steamer will actually carry on a draft of fifteen feet of water. For sail vessels and barges, 75 per cent. The number of round trips of the steamers is placed at fifteen in the Lake Superior trade, and of the schooners and barges at eight, and calculation is made that two-thirds of the up-trips were with cargo and one-third light, which is a fair average. This gives the carrying capacity for the season of 1879 as nearly 8,000,000 tons.

Using the same figures as a basis of computation for the season of 1889, except that the schooners and barges are given ten trips, because more of them towed and thus made faster time than they did ten years ago, the result is nearly 14,000,000, an increase of only 6,000,000 gross tons in the carrying capacity of the lake marine in the past ten years.

Now what has been the growth of the business? That on Lake Superior is taken for an illustration, because it is exact, the record being kept by government officials at St. Mary's Falls Canal. This record shows that there was carried through the canal bound down, in 1879, 451,000 barrels of flour, and last year, 2,228,707; ten years ago, 2,603,666 bushels of wheat, and last year, 16,231,854 bushels; other cereals ten years ago, 951,496, and last year, 2,133,245; ore in 1879, 540,075 tons, and last year, 4,095,855 tons; lumber ten years ago, 35,000,000 feet, last year, 315,000,000 feet. This, reduced to gross tons, makes an aggregate of 779,328 tons of downward bound freight through the "Soo" in 1879, and 5,657,158 tons in 1889. It is fair to assume, and statistics from Chicago and Milwaukee go to show the correctness of the assumption, that the grain business of Lake Michigan has doubled in the past ten years, while the iron ore shipments from Escanaba have increased in the same proportion as those from Lake Superior ports.

Assuming that the capacity in 1879 of 8,000,000 tons is accurate, and that 10 per cent. of it, or 800,000 tons, came from Lake Superior, it would indicate that the other ports furnished 7,200,000 tons of business in that year. Supposing that there had been no increase in the freighting business in the past ten years outside of Lake Superior, this amount added to the business through the "Soo," of last year—nearly 6,000,000 tons—would be nearly sufficient to furnish employment for all the present tonnage capacity, both sail and steam, viz.: about 14,000,000. But, as said before, the grain and ore shipments from Lake Michigan have largely increased during that period. Take this in connection with the fact that a considerable percentage of this 14,000,000 carrying capacity is engaged in the lumber trade of Lakes Huron and Superior, and it can be seen that, unless these figures are absolutely wrong, instead of the prospect being a plethora of tonnage, there will actually be a scarcity. This, too, nothwithstanding the fact that there is now under contract some 50,000 or 60,000 tons carrying capacity. It is maintained by some of the best anthorities that the contemplated additional output of ore alone from Two Harbors Ashland, Marquette, Escanaba and Gladstone will more than take care of this additional tonnage. The stiffening of rates and the contracts that have thus far been made indicate that both shippers and carriers are of the opinion that there will be a scarcity of tonnage the coming season, and probably for several seasons to come.

NEW POST HANGER.

A NEW POST HANGER.

The accompanying cut shows a new line of post hangers, made by Samuel C. Tatum & Co., of Cincinnati, whose "Boss" drop hanger we recently illustrated. Their post hanger embodies the peculiar features described in connection with the drop hanger, having the very convenient form of drip cup, which lifts free from the hanger without spilling the oil; has also the close fitting adjusting screws, and the new boxes, so constructed that the oil will not be thrown out by the revolutions of the shaft, etc. The post hangers, as may be seen, are also provided with two lugs on the back, central with the bolt holes, which relieve any excessive strain on the bolts, but are easily removed, if desired, in the case of fastening to an iron support.

Welding Tool Steel.

In welding tool steel, workmen use a bright yellow heat, and melted and pulverized borax as flux. For ingot iron, some prefer fluxing with sand, a temperature between redness and whiteness, a quick fire and quick work. The steam hammer gives much better welds than the hand hammer. The Steel Co. of Scotland recommends a bright yellow heat; if any flux, three parts of sand to one of common salt, moistened; a V-weld, which, with the neighboring parts, is to be lightly hammered during and after welding; and ulphurless coal.—[Fxchange.

A VERY useful invention, tending to lessen the possibility of accidents in factories, is now being extensively adopted in England. The breaking of a glass, which is adjusted against every wall of every room in the mill, will at once stop the engine, an electric current being established between the room and the throttle valve of the engine, shutting off steam in an instant. By this means the engine was stopped at one of the mills recently in a few seconds, and a young girl whose clothes had become entangled in an upright shaft was released uninjured.

FOREIGN COMMENT.

Rise in Scrap Steel.

A great advance is taking place in the prices of steel and iron scrap bought in Staffordshire. Ironmasters describe the advances on some descriptions as almost fabulous. Steel plate crop ends have doubled in price, being now £6 10 s., and supplies are very short. Steel sheet shearings have advanced to £3 13 s., an increase of £1 11 s. Cast iron machinery scrap has risen to £3 10 s. Lancashire bale hoops have advanced to £3 15 s. an increase of £1 15 s.—[Iron and Steel Trades Journal.

Bridge the Bosphorus.

We learn that a French engineering company have formed a project for constructing a huge bridge across the Bosphorus. The channel between the shores of Europe and Asia, which connects the sea of Marmora with the Euxine, is 872 yards broad, and it is proposed that the bridge to span it should be of one arch only. In these days of huge bridges, this should not offer very serious difficulties from an engineering point of view, if the financial ones can be got over.—[Iron and Steel Trades Journal.

British Railways.

There are 20,000 miles of railway lines in the United Kingdom, constructed at a cost of £900,000,000 sterling, which enormous outlay of capital produces annually a gross income of £70,000,000. The proportion of these great annual receipts due to the payments for the carriage of some 300,000,000 tons of goods is £38,000,000 sterling, while half a million wagons are in use by the railway companies for the conveyance of merchandise, which general expression includes live stock, minerals and miscellaneous goods of all kinds.

A Big Engineering Work.

One of the great feats of the railway engineering of the time is being performed unnoticed in Northern Queensland. A line is being constructed from Cairns to the tin mines of Herbertstown, which, in mountaineering difficulties, may be compared with some of the most arduous undertakings in other parts of the world. It is costing £40,000 to £50,000 a mile, and at this time reaches to 4,000 feet above the sea. A whole range of mountains has to be crossed, and the trains will pass by perilous precipices and yawning chasms

The Silesian Iron Trade.

The *Breslauer Zeitung*, in a leading article, speaks of the unusual prosperity of the Silesian iron trade, and states that there is a dearth of ore, while the stocks of pig iron have almost disappeared, and founders and malleable works are eager to secure supplies at full and paying rates up to the end of 1890. The writer expresses regret at the prohibition to admit Galician and other foreign workmen into the mines, thereby preventing a full supply of minerals, and he further alludes to the fact that the great prosperity at home induces Silesian manufacturers to neglect the Russian trade, which this Winter and next Spring must, therefore, undoubtedly fall into the hands of Belgian and English competitors, and this after all the exertion made in the dull period, now past, to secure the important export trade to that country.

Mechanical Stoking and Hand Stoking Compared.

Economy in the use of fuel for the generation of steam is so important an industrial matter that no one can afford to be indifferent to the attention now being bestowed upon it. In this connection a long series of experiments in the firing of boilers has recently been carried on at the Wingate colliery, the results of which are most interesting. The object of these trials was to establish the relative value of mechanical stoking and of hand firing, and one of the results quoted is annual saving per boiler per annum, where small coal is used, with the mechanical stoker, of £82 14s. 9d. If, however, the hand-firing with small coal is compared with the mechanical firing with "duff" coal, the saving is much greater, amounting to £170 10s. 1d. per annum. The increase of duty obtained from a boiler by the use of the mechanical stokers is 33.3 per cent., of which 20 per cent. is due to the movable bars.—[Engineering.

No More Railroad Building in China at Present.

Railroad construction has ceased in China for the present. From accounts received from China, it seems that the Conservative party has taken advantage of the accidental destruction of the Temple of Heaven by fire, started by lightning, to excite the superstition of the Emperor and chief councilors, and that this accidental fire has been interpreted as a visitation of divine vengeance, consequent upon the imperial order sanctioning the building of railroads. The superstition inherent in the Chinese character has thus been used shrewdly by the conservative leaders to further their purposes. The sanction for the construction of the railroad, it appears, has not yet been formally revoked, but the whole question is, for the present, in abeyance. The progressive party, headed by the Viceroy Li, may be relied upon, however, to make every possible effort to secure the construction of the railroad; but for the present it is very doubtful whether they will be able to do anything. The latest country to enter the field as a builder of railroads is Siam. Heretofore there have been no steam railroads in that country, and the only line of any description has been a street tramway in the city of Bangkok.

Asiatic Implements.

One more illustration of the stage of advancement which has been reached by the mechanical geniuses of Amasia I will borrow from a cutler's shop. Remember, it is the best work of men who are in the full heat of the struggle for life, that we are noting. These cutlers have to compete in the streets of their city with the work of the men of Sheffield. And this is the device that they have been able to originate as the climax of ingenious machinery for the sharpening of knives. They have a grindstone mounted on an axle fixed upon the platform of the little stall where they do their work. A rope is passed three or four times around the axle of the grindstone, and out in the middle of the narrow street, in front of the cutler's shop, stands a man with one end of the rope in each hand, gravely pulling away. When he pulls the right hand, the grindstone revolves towards him; when he pulls the left hand, it revolves from him. By the grindstone squats the knife grinder, cross-legged, obliged to turn the knife over every moment, as the stone changes its course of revolution. There is something pathetic in the spectacle of these men, who have wrestled with the problem of changing a reciprocating motion to a rotary one; have wrestled, doubtless, as valiantly as Edison with his mighty problems of electro-dynamics, and then have given up the problem as insoluble, like the problem of the flying machine, and have settled down to such devices as the most favorable basis on which they contest their market with the aggressive Europeans.—[New York Tribune.

Trials of Armor Plates in Holland.

The Government recently made competitive trials of compound armor plates for the new war vessels now being built in the Netherlands. Four plates were sent in, two by English and two by French firms, measuring 2.74 m. by 2.14 m. and 28 cm. thick, and weighing about 12.5 tons. Placed side by side, with a double backing of 60 cm., consisting of horizontal and vertical teak balks, and a back-plate of ¾ in., they formed a target which was held up by heavy timbers. The whole was arranged on the deck of an old wooden gunboat. Each firm had used its own number and diameter of bolts to fix the armor to the backing. The French system distinguishes itself by its great number of light armor bolts. Three shots were to be fired on each plate, 27.5 in. apart. The projectiles were 28 cm. diameter and weighed 250 kg., and were fired at a distance of 80 m., but the firing charge was adjusted so as to make the striking velocity the same, viz.: as if the shot was fired at a distance of 1,600 m., with a full charge. The French plates of Hauts Fourneaux St. Chamond and of Marrel Freres were entirely broken up at the first two shots, so that the third shot was not fired at all. The English plates, from Messrs. Brown and Messrs. Cammell stood the trials better. The Cammell plate (Wilson's patent) was quite perforated by the three shots, and lost a considerable part of its steel facing. Brown's plate proved to be the best; two of the projectiles broke up entirely, but the third shot pierced the plate. All the plates, except Cammell's were cracked over the full breadth. The results of these trials show the resistance to perforation of steel to be 30 per cent. more than that of wrought iron, whilst formerly the tests only gave 10 per cent. This may be ascribed to the fact that the target, being placed on a vessel and not on shore, gave way to the shots.

The Statistics of the Scotch Iron Trade.

We published in our last issue the annual returns of the Scottish iron trade, as compiled by the Scottish Iron-masters' Association. The returns are the most favorable that have been issued for many years past, and they confirm to a remarkable extent the oft-repeated assertion that the iron trade is at present as sound, if not sounder, than it has ever been before. Though the production shows a falling off of nearly 29,000 tons as compared with that of 1888, and that, too, in spite of the fact that 11 additional furnaces were in blast, yet the returns under the heads of consumption, exports and reduction of stock far more than counterbalance the decline in the production. It is, however, exceedingly probable that this decline is much more nominal than real, and that the real explanation is to be found in the fact that some of the furnaces that were formerly producing common pig are now turning out hematite, the production of which is more profitable for the makers than the cruder material would be. The total production was 999,928 tons, and though, as we have said, it fell short of the previous year, by about 29,000 tons, yet, as compared with 1887, there has been an increase of nearly 67,000 tons. The consumption for the year amounted in all to 762,285 tons, being the largest consumption yet reached, and an advance on the previous year of no less than 173,636 tons. Of this enormous quantity the foundries took 185,896 tons, and the malleable iron and steel works 576,389 tons. Again, if we turn to the shipments we find an increase of 22,504 tons, but of this quantity only 6,000 tons were sent abroad, the remainder being sent coastwise for consumption in England. As regards stocks, their position is probably the best feature in the returns inasmuch as the reduction during the year clears off nearly one-half of the increase to the public stocks during the four preceding years. The total reduction was 208,593 tons—namely 87,445 tons from Messrs. Connal's stores, and 121,148 tons from those in the makers' hands. It is remarkable that the largest withdrawals occurred in November, when the "boom" was at its height; but though speculation was, of course, a determining factor in the result—especially the action of the Cleveland operators, who helped to drive the price of the local article beyond the level of the Scotch—yet the collapse would have been as sudden as the rise if the condition of the iron trade had been less sound at bottom. Fortunately, the decline that subsequently occurred in values was of a gradual character, and the trade was spared the spectacle of an even imaginary panic. The past year has seen Scotch iron at its highest price since 1880, when it reached £3 13s. 6d., but it should be remembered that in that year the public stocks amounted to only 495,850 tons, whereas in the early part of the past year they reached a total of nearly one million and a quarter tons. The highest price last year was 64s. 10½d., being 20s. 9½d. over the highest quotation of 1888, and 5s. 9d. over the lowest in the same year. Another feature in the statistics worthy of attention is the great decline in the quantity of English iron sent into Scotland, the amount in 1888 having been 427,000 tons as contrasted with 271,161 tons last year. The statistics are altogether of an exceedingly favorable character, and it is to be hoped that those for the present year will, when the time comes, show an improvement upon the present returns.—[Iron & Coal Trades Review.

INDUSTRIAL SUMMARY.

New Enterprises :—

B. W. Walker will build a machine shop at Milledgeville, Ga.

The Detroit Steel & Spring Works, Detroit, Mich., has filed articles of association; capital $246,153.

A. H. Anthony has just started a new machine shop at Jewett City, Conn., and will build light machinery and tools.

The Traverse City Manufacturing Co. is the title of a new concern to operate a machine shop and foundry, at Traverse City, Mich.

The American Heating Co. has been organized at Beloit, Wis., to manufacture a hot water heating apparatus patented by G. A. Houston.

The Thomas Manufacturing Co. has been incorporated at Little Rock, Ark., to conduct a general foundry and machine works; capital stock, $100,000.

W. C. Pendleton has leased the foundry and machinery of James Reed & Sons, Warren, O., and will make a specialty of light castings.—[Chronicle.

Washington, Pa., is to have a new industry. The Tyler Tube Works, of Boston, will be removed to that place, and a stock company organized with a capital stock of $200,000.

A charter has been granted in Pennsylvania to the Pittston Car Wheel Co., with a capital of $20,000. The directors are J. W. Mosier, J. K. Sax, W. Griffith, E. G. Mercur, of Pittston, and L. B. Hilliard, of Wilkesbarre.

The American Flush Door Co. is the name of a company incorporated in Indiana last week. H. R. Duval, of New York City is president; J. L. Wagner, of Terre Haute, vice-president, and Charles Lewis, of Indianapolis, secretary and treasurer.

The Clinch Valley Coal & Iron Co. have decided to erect a muck bar and rolling mill and wrought iron pipe works, at Richlands, Va., a new town which is being laid out on the Clinch Valley extension of the Norfolk & Western R. R.—[Herald, Roanoke, Va.

Jos. D. Weeks, of Pittsburgh, Pa., is interested in a large iron and steel plant to be located at Iron Gate, Va., which will manufacture merchant iron and steel, steel plate, cotton hoop iron and other iron and steel commodities. About 600 men will be employed.—[Dispatch, Pittsburgh.

Another new enterprise at Springfield, O., is the making of steel castings, of which W. J. Maxwell, formerly superintendent of the Whitely Steel Co.'s works, and Geo. H. Vincent, of Syracuse, N. Y., are the proprietors. It is the intention of the firm to use the crucible process at present.—[Repository.

The Pittsburgh *Dispatch* says that F. N. Hoffstot, James M. Bailey, James W. Friend, Frank H. Zimmers and C. C. Morrow, of Pittsburgh, Pa., will apply for a charter for the Union Foundry & Machine Co. It is expected the plant will be in operation by April 1, and will run exclusively on heavy machine mold gearing. It will be the third of its kind in existence.

The Connellsville (Pa.) *Courier* states that Dr. J. J. Mullen, of Dunbar, Pa., is organizing a stock company to erect extensive steel works at that place. Nearly all the capital stock has been subscribed. Among the stockholders are Sidney Patterson, Thomas Ryder, Henry Smith and Barney Neelan, of Dunbar, and George H. Smith & Son, of Leechburg. The plant will employ about 2,000 men.

The following two incorporations seem confusing: Lakeside Nail Co., of Chicago; to manufacture iron and steel products; capital stock, $40,000; incorporators, W. Dyer, S. C. Gibbs and A. A. Mason.—The Lakeside Nail Co. has been organized by Messrs. H. O. Bonnell, W. Scott Bonnell, James L. Botsford Richard Brown, C. D. Arms, Frank P. Wick and T. F. Woodman, well known iron manufacturers at Youngstown, O., and George S. Griscom, of Pittsburgh, and have leased the large nail factory of the Chicago Steel Manufacturing Co., at Hammond, Ind., and will commence at once the manufacture of cut steel nails.

New Illinois incorporations: Munger-Colton Manufacturing Co., at Chicago, to manufacture hardware specialties; capital stock, $20,000; incorporators, B. L. Munger, C. L. Munger, G. A. Colton.—Peoria Metal Spinning Co., at Peoria, to deal in railway signals and to stamp and die drawings upon metals; capital stock, $50,000; incorporators, C. W. Robinson, J. C. Babb and J. H. Bevington.—Art Metal Co., to manufacture articles from iron and other metals; capital stock, $50,000; incorporators, E. T. Harris, A. B. Camp, Grant Newell.—The Massasoit Machine Co., to manufacture specialties in iron, die sinking, etc.; incorporators, Nathan Everett, Frederick Davis and others.—Bunker Hill Nail Co., Bunker Hill; to manufacture nails and nail machinery; capital $5,000; incorporators, P. C. Higgins, W. N. Budd and J. T. Cummings.—Warren Manufacturing Co., Centralia; to manufacture a patent wrench; capital, $20,000; incorporators. Thomas Warren, O. V. Parkinson and A. H. Rainey.

Enlargements, Additions, Removals, Etc.:—

The Rogers Foundry Co., at Bellville, Ill., expect to increase their capital stock from $25,000 to $75,000.

The Duquesne (Pa.) Tube Works has commenced the construction of another welding furnace at their plant.

The Michigan Saw Co., East Saginaw, Mich., will build new works, and fit up with the most modern machinery.

It is stated that Oliver Bros. & Phillips, of Pittsburgh, Pa., will add a new department to their Allegheny mill for the manufacture of railroad rolling stock supplies.

The Richmond Galvanized Iron Cornice Co., of Richmond, Va., reported in last issue as incorporated, has purchased the Richmond Galvanized Iron Works and expects to enlarge the same.

The W. & A. Fletcher Co., of New York City, builders of marine engines, etc., are erecting new shops at the foot of 14th street, Hoboken, N. J. It is expected that they will be completed in May.

It is stated that the Grinnell Agricultural Co. of Grinnell, Ia, one of the largest manufacturing concerns in the West, will purchase a tract of land near Washington Heights, Chicago, to which it will remove its plant during the year. Work will be commenced in the Spring.

Spang, Chalfant & Co. Pittsburgh, Pa., have commenced the erection of a new blast furnace. It will be 75 feet high, will have a 17-foot bosh, three hot-blast stoves of a new design, and will cost about $200,000.

It is understood that the Norton Iron Works, of Ashland, Ky., and the Kelly Nail Co., of Ironton, O., will bond their present plants, and will unite in building a steel plant on the Ohio river, opposite Ashland, Ky.

Messrs. Hammond & Son, Pittsburgh, Pa., having sold their property (the Pennsylvania Forge), are now looking for a new location on which to erect new works, which will consist of twenty-four puddling furnaces.

The Passaic Rolling Mill Co., of New York City, has completed its new open-hearth plant, which consists of two 20-ton furnaces, with blooming-mill and all modern appliances, thus doubling the capacity of its work.

Stephen E. Cleaves & Son, proprietors of the Portage Lake Foundry & Machine Works, at Houghton, Mich., says the *Mining Gazette*, are making very extensive improvements, and, when completed, will undoubtedly have one of the largest and best arranged foundries in the Northwest. The foundry will be 60x150 feet, and machine shop 40x120 feet. They will be equipped with all modern improvements.

Big Furnace Records :—

On the night of the 8th inst. No. 1 turn at the Edgar Thomson Steel Works, of Carnegie Bros. & Co., Limited, at Braddock, Pa., turned out 2,525 rails in eight hours. This is the largest output on record in the same length of time, the next highest being 2,228 rails.—[Iron Age.

Minneapolis charcoal iron furnace, of the York Iron Co., at Black River Falls P. O., Wis., made a very good run in 1889. The number of days in blast was 249½, and the amount of iron turned out in that time was 17,017 tons. The daily average for the year was 68 2-10 tons.—[American Manufacturer.

Two furnaces, with working hearths 7x18 feet, designed by the Alex. Laughlin Co., of Cleveland, for the Joliet works of the Illinois Steel Co., heated all the steel necessary to produce 204,240 pounds of No. 5 wire rods in one turn. Eleven consecutive turns averaged 182,000 pounds each turn, and one week's work was 940 gross tons. Another furnace, with a hearth 7x14 feet, built by the same firm for Lake Erie Iron Works, Cleveland, has, for the past six months, actually averaged over 50,000 pounds finished iron for every single turn, some of the best turns being over 60,000 pounds, while, when the smaller sizes, such as ½-inch round, are rolled, a production of 42,000 pounds of finished iron can be made with ease.—[Iron Age.

Fires and Accidents:—

Warren, O.—A small fire occurred in the Paige Tube Co.'s works January 24, doing but little damage.

Kansas City, Mo.—The Industrial Iron Works were totally destroyed by fire January 19; loss, $50,000.

Ocean City, N. J.—J. C. Lake & Co.'s foundry was burned January 25, by burning grass; loss not known.

Urbana, Ill.—Wright & Louis foundry was burned January 12; loss, $40,000; fully covered by insurance.

St. Louis, Mo.—The works of Freeman Wire & Iron Co. were destroyed by fire January 23; loss, $100,000; insurance, $60,000.

General Industrial Notes:—

G. & H. Barnett, the Black Diamond File Works, Philadelphia, Pa., have issued a neat packet tablet and calendar combined. It has a celluloid cover, and is a tasty souvenir.

An item appeared in last week's *Iron Trade Review* credited to the Duluth *Herald*, by mistake, which stated that the Northern Pacific Railroad car shops were to remove to West Duluth. They will not remove.

The Clauss Shear Co., Fremont, O., whose works were destroyed, as stated last week, write that they have decided to rebuild the works at once, and work on them will be pushed rapidly. The capacity of the new works will be doubled, and the facilities for filling orders greatly increased. They expect to be filling orders again in April.

The Westinghouse Machine Co., of Pittsburgh, has received an order, through its agency at Copenhagen, Denmark, for one of its now famous Automatic compound engines. The size selected is 14 & 24x14, and it will be used at Kopparbergs Bergslaget, at Falur, near Stockholm, Sweden. Large numbers of these engines are now being shipped to foreign countries.

The latest product of the paper industry is a paper tool handle, light and apparently strong and durable. There can be no bursting or chipping in use, and the hand is insured against possible injury from slivers, as in the case of wooden handles. The bore of $\frac{1}{16}''$ may be increased to $\frac{3}{4}''$ without the least injury to the handle. These new paper tool handles are made on a large scale by Gustave Muhle, paper goods manufacturer, in Dresden, Saxony.

A Monument to John Ericsson.

Congress should, according to our way of thinking, acknowledge the merits of our great countryman, John Ericsson, and his services to his adopted country, by erecting a marble statue to him among the statues of the country's great men which decorate the minor rotunda in the United States capitol. That John Ericsson is deserving of this honor is a fact indirectly admitted by Congress, inasmuch as that body has purchased for the capitol the painting which represents the encounter between the Monitor and the Merrimac. Why, then, not take the full step and award to the creator of that work of genius, which dissipated so many fond hopes of the rebels,—award to him that honor which by right belongs to him? Why not repay, by the erection of a valuable statue, at least a part of that debt, on which, according to reports, not even the interest was paid, by the government, during the lifetime of the deceased.—[Chicago Hemlamdet.

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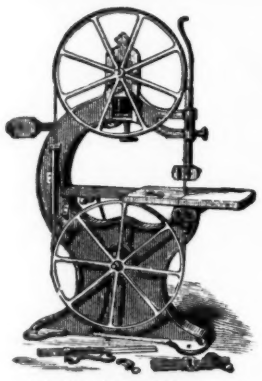
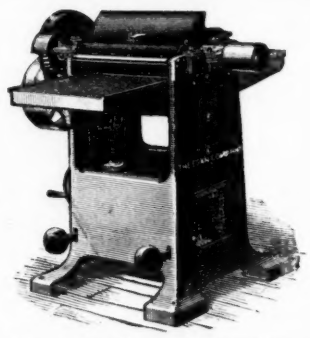


(1) No. 1 Band Saw.



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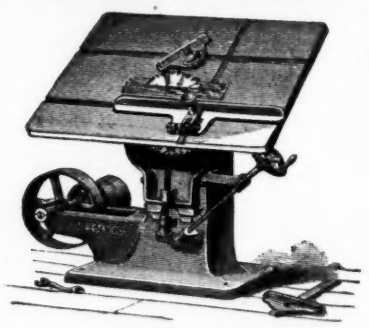

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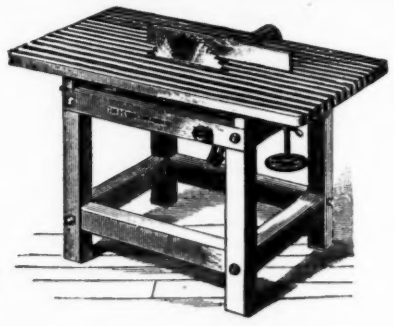

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THE STEEL RAIL MARKET.

Two of the rail mills in Eastern Pennsylvania have marked up their price for rails to $36, at the mill, but others are still selling at $35, at the mill, or its equivalent at least, to one of them, $35.75, at tidewater. Sales during the week have not been large, aggregating about 10,000 tons. It is reported that there are some round lots in the market, so that it really appears that sellers during the prolonged spell of inactivity have been able to hold out better than buyers. The Board of Control report for the 1st of January shows that up to that date the total sales of rails by the mills in the association, for delivery in 1890, aggregated 746,895 gross tons. It is the impression, however, that the sales really have been considerably larger, one authority insisting that they cannot be far from 1,000,000 gross tons, the allotment being 1,060,000 tons. The different mills sold and shipped during 1889, the following quantities of steel rails, of 50 lbs. per yard and upward, as reported to the Board of Control. We have added the figures for 1888 by way of comparison:

STEEL RAILS SOLD AND SHIPPED, FIFTY POUNDS AND UPWARD, FOR 1888 AND 1889.

	1888. Gross tons.	1889. Gross tons.
North Chicago	161,945	.....
Union	126,016	.....
Joliet	114,675	.....
Illinois Steel Co.	402,636	401,795
Carnegie Bros. &Co	138,946	267,461
Scranton Steel Co.	136,029	155,814
Lackaw'na Coal & Iron Co.	128,310	139,141
Bethlehem Iron Co.	85,448	121,262
Pennsylvania Steel Co.	121,960	103,931
Cambria Iron Co.	82,363	64,947
Cleveland Rolling Mill Co.	29,940	14,807
Troy Steel & Iron Co.	25,110	2,280
Western Steel Co.	39,168	.....
Worcester Steel Co.	6,569	.....
Springfield Iron Co.	3,705	.....
Totals	1,200,184	1,271,438

It will be understood that these totals in both years do not include light rails, of which some of the mills make considerabe quantities, while others make none. It should be stated, too, that for the year 1889, the Allegheny Bessemer Steel Co., at Pittsburgh, is not included. They probably added about 75,000 tons to the make. The figures are interesting, as showing how the trade has narrowed down practically to three groups of mills—the Chicago mills, now under one management; the Carnegie, Allegheny and Cambria, in Western Pennsylvania, and the Scranton, Pennsylvania, Bethlehem and Lackawana, in Eastern Pennsylvania. It will be observed that the principal gains in 1889 have been made by Carnegie, Scranton and Bethlehem.—[Iron Age.

Large Casting of Swedish Steel.

The Bofors Engineering Co., Sweden, has just dispatched an unusually large steel casting to the Elsinore Shipbuilding Co., Denmark. It forms part of the keel and stern-post of a new ice breaking steamer, and measures 35 ft. in length and 14 ft. in breadth. The state railroads were not able to convey it, so it had to be brought to Otterbucken. and from there by water to Gothenburg. From this town it goes by rail to Helsingborg, as none of the steamers from Gothenburg could receive it on deck. A similar casting has been ordered for another ice-breaking steamer.

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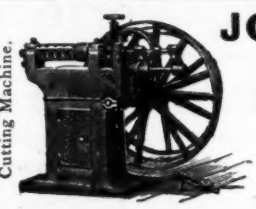

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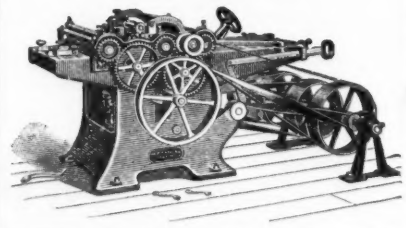

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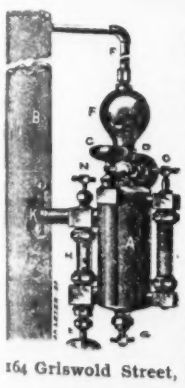

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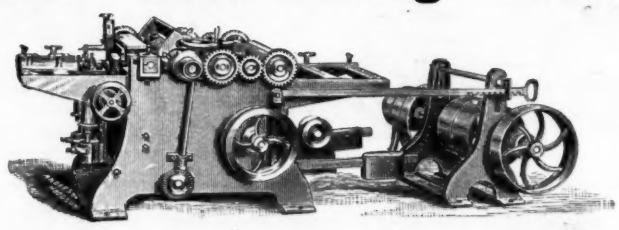

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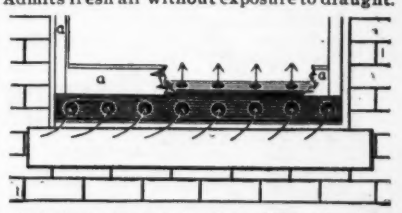

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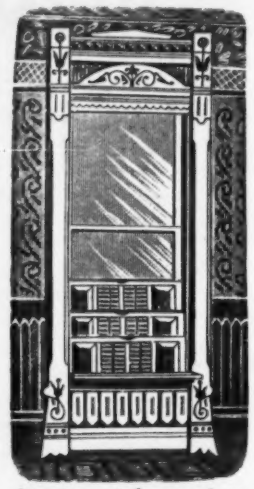

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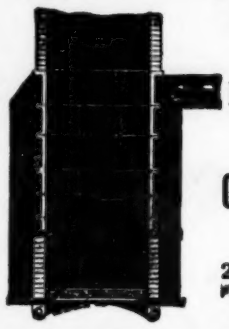

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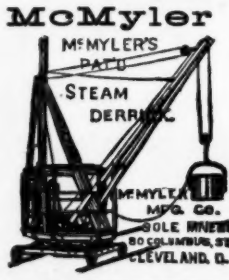

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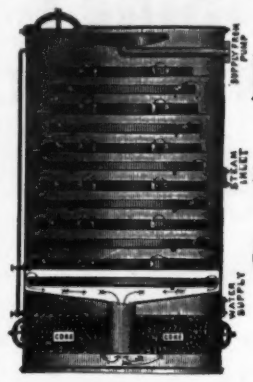

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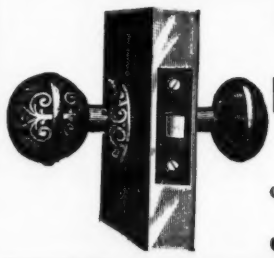

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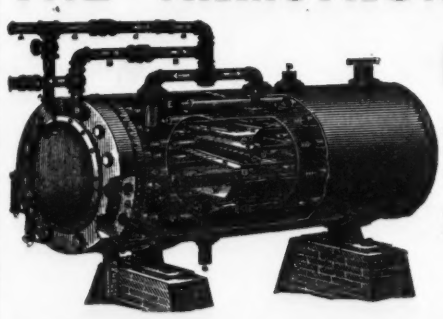

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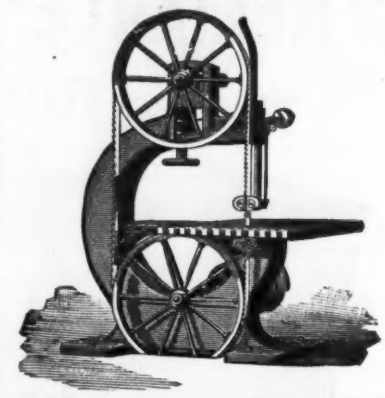

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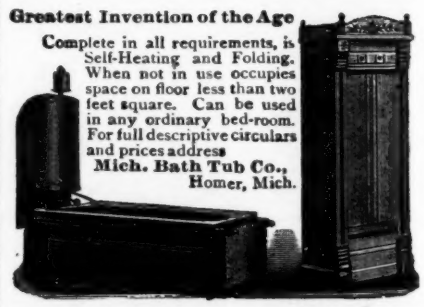

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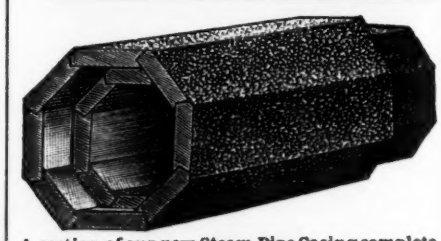

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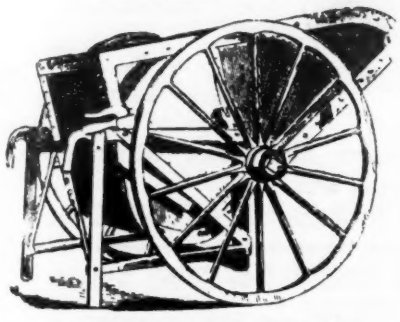

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LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry (new classification), $18 75@19 25; Southern Coke No. 2 Foundry (new classification), $18 25@ 18 75; Southern Coke No. 3 Foundry (new classification), $17 75@18 25; Grey Forge, $17 25@17 75; White and Mottled, different grades, $15 50@16 50; Silver Grey, different grades, $16 25@17 25; Southern Charcoal No. 1 Foundry, $18 25@19 50; Southern Charcoal No. 1 Mill, $17 00@17 50; Southern Car Wheel, Standard brands, $23 50@24 50; Southern Car Wheel, other brands, $19 25@21 75; Hanging Rock Coke No. 1 Foundry, $18 50@19 00; Hanging Rock Charcoal No. 1 Foundry, $22 00@ 22 50; Hanging Rock Cold Blast, $24 00@26 00; Hanging Rock Warm Blast, $00 00@00 00.

LOUISVILLE (reported by Hall Bros. & Co.): HOT BLAST FOUNDRY—Southern coke No. 1, $19 00@19 50; Southern coke No. 2, $18 75@19 00; Southern coke No. 3, $18 00@18 75; Mahoning Valley (Lake ore mixtures), $20 00@00 00; Southern charcoal, No. 1, $18 50@19 00; Southern charcoal, No 2, $18 00@18 50; Missouri charcoal, No. 1, $19 50@20 00; Missouri charcoal,No. 2, $19 00@19 50. FORGE—Neutral coke, $17 50@18 00; Cold short, $16 75@17 00; Mottled, $15 50@16 00. CAR WHEEL AND MALLEABLE—Southern (standard brands), $23 50@ 24 50; Southern (other brands), $19 50@20 50; Lake Superior, $23 00@23 50.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $19 50@20 00; Southern Coke No. 2, $19 00@19 50; Southern Coke No. 3, $18 50@19 00; Southern Grey Forge, $18 00@ 18 50; Southern Charcoal No. 1, $20 00@21 00; Southern Charcoal No. 2, $19 50@20 00; Missouri Charcoal No. 1, $00 00@23 00; Missouri Charcoal No. 2, $21 00@22 00; Ohio Softeners, $20 50@ 21 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $24 50@25 00; Southern, $21 00@ 24 50. CONNELLSVILLE COKE—East St. Louis, $5 25; St. Louis, $5 40.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $19 70@20 20; Mahoning and Shenango Valley strong, No. 2 Foundry, $18 70 @19 20; Niagara No. 1, $20 00@00 00; Niagara No. 2, $19 00@00 00; Niagara No. 3, $18 25@00 00; Ohio Softener No. 1, $19 75@00 00; Ohio Sofener No. 2, $18 75@00 00; Lake Superior Charcoal, $22 50@23 00; Tennessee Charcoal, $21 50@22 50; Southern Softener No. 1, $20 50@00 00; Southern Softener No. 2, $19 75@00 00; Alabama Car Wheel, $26 00@00 00; Hanging Rock Charcoal, $24 50@00 00.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $22 50@23 50; Lake Superior (coke) Bessemer, $23 50@24 50; Katahdin (Maine charcoal), $26 00 @26 50; Lake Superior Coke, Foundry, all ore, $22 00@22 50; Lake Superior Coke, Foundry Cinder Mixed, $20 25@20 75; Standard Ohio Black Band, $21 00@22 00; Southern No. 1, $20 50@21 00; Southern Gray Forge, $19 00@ 19 50; Jackson County (Ohio) Silvery, $19 50@ 20 00; Old Car Wheel, $21 50@22 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $19 50@20 00; No. 2 Foundry, $18 50@19 00; Grey Forge, $18 00@18 50; White and Mottled, $17 00@17 50; Warm Blast Charcoal, $20 00@24 00; Cold Blast Charcoal $20 00 @24 00; Bessemer, $23 00@23 50.

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	2 00
4½ to 6 by ⅜ to 1 inch	2 10
1¾ to 6 by 1¼ to 2 inch	2 40
1¼ & 1¾ by ⅜ to ¾ inch	2 10
1 & 1¼ by ⅜ to ¾ inch	2 20
⅝, ¾ and ⅞ by ⅜ to ⅝ inch	2 40

Round and Square.

1 to 1⅜ inch	2 00
2 to 2¾ inch	2 20
2¾ to 3¼ inch	2 50
3⅜ to 4 inch	3 00
4¼ to 4½ inch	3 50
4¾ to 5 inch	3 70

Oval.

⅜ to 1¼ inch	2 40
⅝ to ¾ inch	2 60
½	2 80
⅝	3 20

Half Oval and Half Round.

1½ to 3 inch	3 10
⅞ to 1¼ inch	2 70
⅝ to ¾ inch	3 20
½	3 50
⅝	5 00

Heavy Band.

1½ to 6 by ¼ and 5-16 inch	2 20
1 to 1¾ by ¼ and 5-16 inch	2 30
¾ to ⅞ by ¼ and 5-16 inch	2 50
½ to ⅝ by ¼ and 5-16 inch	3 00

Hoops.

1¼ to 4, Nos. 13 to 15	2 80
1¼ to 2, Nos. 16 to 18	2 90
1¼ to 2, No. 19	3 05
1¼ to 2, No. 20	3 10
1¼ to 2, No. 21	3 20
1¼ to 2, No. 22	3 30
15-16, 1 and 1⅛, Nos. 13 to 15	3 00
15-16, 1 and 1⅛, Nos. 16 to 18	3 10
15-16, 1 and 1⅛, Nos. 19 and 20	3 20
15-16, 1 and 1⅛, No. 21	3 30
15-16, 1 and 1⅛, No. 22	3 40
⅞, Nos. 13 to 15	3 20
⅞, Nos. 16 to 18	3 30
⅞, Nos. 19 and 20	3 40
⅞, No. 21	3 50
⅞, No. 22	3 60
13-16, Nos. 13 to 15	3 40
13-16, Nos. 16 to 18	3 50
13-16, Nos. 19 and 20	3 60
13-16, No. 21	3 70
13-16, No. 22	3 80
¾, Nos. 13 to 15	3 50
¾, Nos. 16 to 18	3 70
¾, Nos. 19 and 20	3 80
¾, No. 21	3 90
¾, No. 22	4 00
11-16, Nos. 13 to 15	3 70
11-16, Nos. 16 to 18	3 90
11-16, Nos. 19 and 20	4 00
11-16, No. 21	4 10
11-16, No. 22	4 20
⅝, Nos. 13 to 15	4 00
⅝, Nos. 16 to 18	4 20
⅝, Nos. 19 and 20	4 30
⅝, No. 21	4 40
⅝, No. 22	4 50
⅝, No. 23	4 60

Light Band.

1⅛ to 6 by ⅛ to 3-16 in	2 50
1⅛ to 6 by Nos. 11 and 12	2 60
1 to 1⅛ by ⅛ to 3-16 in	2 60
1 to 1⅛ by Nos. 11 and 12	2 70
⅞ and 13-16 by ⅛ to 3-16 in	2 90
⅞ and 13-16 by Nos. 11 and 12	3 00
¾ and 11-16 by ⅛ to 3-16 in	3 20
¾ and 11-16 by Nos. 11 and 12	3 30
⅝ and 9-16 by ⅛ to 3-16 in.	3 50
⅝ and 9-16 by Nos. 11 and 12	3 60
½ by ⅜ to 3-16 in	3 80
½ by Nos. 11 and 12	3 90

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	3 00
⅞ inch, " " " 13 and 14	3 20
¾ inch, " " " 11 and 12	3 30
¾ inch, " " " 13 and 14	3 50

Sheet Iron.

No. 10 to 14	2 75
No. 15 to 17	2 90
No. 18 to 21	3 10
No. 22 to 24	3 30
No. 25 to 26	3 45
No. 27	3 55
No. 28	3 65

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅜ to 11-16 and 4¼	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
Spring	"	3 50
Sleigh Shoe	"	3 00
Toe Calk	"	3 25
Cutter Shoes, tapered and burr.	"	3 25

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$22 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	14 00
Iron axles	26 00
Axle turnings	16 00
Wrought turning (free from cast)	14 00
Cast borings	10 00
Uncut wrought iron boilers	13 00
Steel boiler plates	15 00
Grate Bars	8 50
Pipes and flues (Clean)	14 00
Tank iron	14 00
Hoop and band iron	14 00
Sheet iron	10 00
Wrought drillings	12 00
Malleable iron	10 00
	GROSS TONS
Old iron T rails	26 00
Old steel rails	25 00
Old car wheels	18 50
Old copper	℔ 10
No. 1 H. red Brass	11
Heavy yellow brass	8¼
Light yellow brass	6
Scrap Zinc	
Tea Lead	
Heavy Lead	3¼

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Rooms 716. 717, 718, 719 Perry-Payne Bld'g

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J. H. OUTHWAITE. W. G. POLLOCK.

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LAKE SUPERIOR AND MENOMINEE RANGE

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AND METALS.

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Strong Foundry and American Scotch Irons, Gray Forge and Bessemer Irons for steel purposes.

Room 57, Grand Arcade, Cleveland, O.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¼

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.... dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70@70& 5
" " " extra.....dis 60&5@60&10
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard dis 60&10
Shultz Raw Hide Leather Belting, single,.....dis 35&5
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 35&5
Standard, oak tanned.....dis 55@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White .....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 30
" Independent.....dis 45
" Little Grant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
National Combination.....dis 4
Sweetland " .....dis 40
Skinner " .....dis 40
" Independent.....dis 40
Almond Drill.....dis 25
Morse " .....dis 15
Skinner " .....dis 30

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3¼

Drill and Drill Stocks.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard.....dis 50&10
Cleveland.....dis 50&10

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 40@46
H. H. Barton.....dis 40@46

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Union Stone.....dis 60
Sterling.....dis 60
Vulcanite.....dis 15@20
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 65@70
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¼	3⅛
Hexagon	15⅝	11⅛	8½	6	5¾	5¼	5
Washers	9	8	7	5	4½	4¼	4½

In lots less than 100 lbs, ₩ lb add ½c., lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30
{ Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 63
Sheet Rubber.....₩ lb 12@24
Vulcanized Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 55

Rivets.

Iron, Thousand, list November 17,.....dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 40@40&10
H. H. Barton's.....dis 40@40&10
New England Flint.....dis 40@40&10
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 55
Machine, round head, iron.....dis 50
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11¾c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30
Maneer's machinist.....dis 50&10

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Improved Screw Cutting FOOT AND POWER LATHES

Drill Presses, Shapers, Band, Circular and Scroll Saws. Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.

THE SEBASTIAN-MAY CO.,
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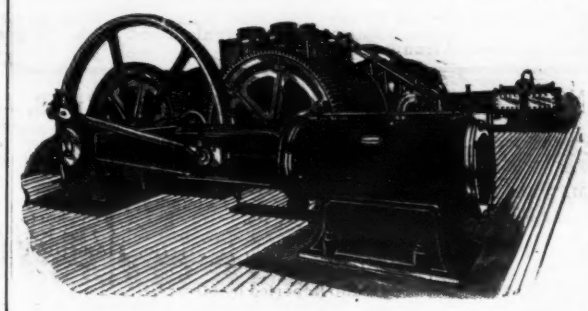
Webster, Camp & Lane Machine Co.



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Mining Machinery,
Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.
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CORNISH PLUNGER AND BUCKET LIFT PUMPS.
Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.
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"SPECIAL STAMPERS OF SHEET METALS."
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Ask your dealer for the Avery Patent Seamless Steel Elev. Bucket. THE AVERY STAMPING CO.,
Successors to The Avery Elevator Bucket Co.
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Lubricator for Traction, Portable and all other small engines, pumps, &c. Single Connection.

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Unique Automatic Steam Sight-Feed
LUBRICATORS.
Indorsed by Leading Engine Builders.
Manufactured under strong patents, the validity of which is acknowledged.
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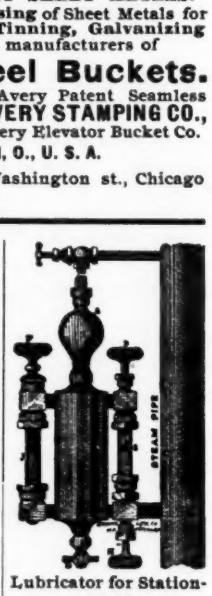
Active Agents Wanted. Special inducements offered Dealers and Jobbers.



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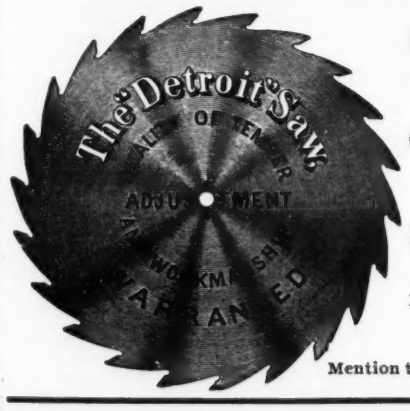

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MANUFACTURERS OF
CIRCULAR, GANG, DRAG, MULAY & BAND
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It will pay you to get our prices and guarantee.
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STEEL CASTINGS
FROM 1-4 TO 15,000 LBS. WEIGHT.
True to pattern, sound, solid, free from blow-holes and of unequaled strength.
Stronger and more durable than iron forgings in any position, or for any service whatever.
60,000 CRANK SHAFTS and 50,000 GEAR WHEELS of this steel now running prove this.
Crossheads, Rockers, Piston-Heads, etc., for Locomotives. STEEL CASTINGS of every description.
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ARCHITECTURAL WORK in all its branches.
Car Wheels,
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Boiler Cleaner.
Using no Chemicals—nothing but Potatoes.
It is no experiment. It will keep your boiler and flues clean, besides saving you from 15 to 30 per cent. of fuel A guarantee contract given with each sale. We refer you by permission to the Fond du Lac and First National Banks of our city.
H. T. Sackett & Co., Fond du Lac, Wis.

OIL ALWAYS BELOW BURNERS---BY USING OUR SYSTEM.
OUR SYSTEM IS INSURABLE IN ALL INSURANCE COMPANIES.
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425 MAIN STREET, SPRINGFIELD, MASS.

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WM. PICKETT, SON & CO., 170 LAKE ST., CHICAGO, ILL. SEND FOR CATALOGUES.

HARDWARE MARKET.

Augers and Bits.

ommon augers and bits.....dis 70
nell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $2 75@3 25
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩dox. $6 25@6 75
Others.....₩doz. $5 75@6 00
Full polished.....$8 25

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Carriage, common, new list..... Sargent's list dis 70&12½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 62½
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60&5
Fast joint, broad.....dis 55&10&5@60&10
Loose joint.....dis 70
Loose joint, jap.....dis 70
Loose joint, jap. with acorns.....dis 70
Loose pin, acorns.....dis 70
Loose pin, japanned acorns.....dis 70
Loose pin, acorns, jap. plated tips.....dis 70
Wrought steel—
Wrought, fast joint, narrow.....dis 70
Wrought, fast joint, broad.....dis 70
Wrought, loose joint, broad.....dis 70
Table Butts, back flaps, etc.....dis 70
Regular inside blind.....dis 70
Light inside blind.....dis 70
Loose pin.....dis 70
Light loose pin.....dis 70

Chains.

Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 } 50&10@50&10&5
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887..dis 50&10&5@60
Galvanized Pump Chain.....₩ lb 5¼@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 70@70&5

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 10&10@70
Climax, (Anti-Friction).....dis 70
Star.....dis 40&10@40&10&5
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No.	10	9	8	7	6	
Ausable, ₩ lb.	23	24	25	26	28	dis 25&10@25&10&10
Putnam, ₩ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10@25&10&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 66⅔
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10@70&10&10
Pocket levels.....dis 70&10@70&10&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@00
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods dis 70&5@70&10&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 65&5
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@66...dis 10
Rifle razor.....dis $9 50 net

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ dox $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Dr vers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

Steel and iron, Nickel plated..... } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, January 2, 1888.

American iron carpet tacks all kinds.....dis 70&5
Steel carpet tacks all kinds.....dis 70&5
Swedes iron carpet tacks, all kinds.....dis 70&5
Swedes iron tacks.....dis 70&5
Swedes iron Upholsterers' tacks.....dis 70&5
Tinned Swedes iron tacks.....dis 70&5
Tinned Swedes iron Upholsterers' tacks.....dis 70&10
American iron cut tacks.....dis 67½&5
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10
Tinned capped trunk nails.....dis 60

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DESIGN is approved by all practical men.
STRENGTH is ample where principal strains are.
DRIP CUPS are lifted free without spilling any oil.
ADJUSTING SCREWS are made a good fit.
BOXES are easy to fit up and will not throw oil.
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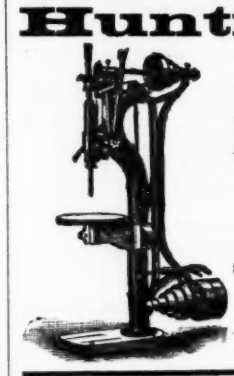

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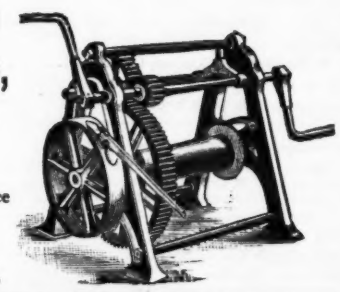

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MERCHANT'S GUARANTEED Roofing Plates.

WE not only give the purchaser the best Roofing Plates, but we protect him:

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SECOND—By stamping each sheet with the brand and thickness.

THIRD—By excluding wasters or defective sheets.

FOURTH—By branding the net weight of the 112 sheets on each box, to satisfy the customer (in this age of lightweight plates) that he is obtaining **FULL WEIGHT.**

For the benefit of those wanting the very best Roofing Plates, we assert, and are prepared to prove, that there are no other brands of roofing tin offered in the market to-day, by any firm, under the four different guarantees given above by this house, and we challenge a public contradiction of this statement.

OUR BOOK ON TIN ROOF WILL BE FURNISHED FREE ON APPLICATION.

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The Bulldozer
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Punch and Shears,
THE IMPROVED
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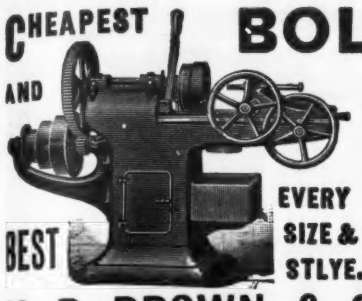

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Standard Time.

Mt. Vernon & Pan Handle Route.

C., A. & C. Ry. Co.	Arrive.	Depart.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 00 a m	8 00 p m
Akron, Col. & Zanesv'e Ex...	12 50 p m	1 05 p m
Akron & Orrville Accom.....	9 40 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman Palace sleeping cars attached. All other trains daily, except Sunday.

Erie Railway.

Depot, South Water Street and Viaduct.

	Arrive.	Depart.
N. Y. & Pitts. Express.....	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

WM. THORNBURGH, Gen. Manager. R. A. CARRAN, Gen. Pass. Agt.

Cleveland, Lorain and Wheeling.

All trains arrive and leave the Union Depot as follows:

	Depart.	Arrive.
Wheeling Express.....	6 45 a m	6 55 p m
Uhrichsville Express.....	4 00 p m	9 20 a m

OSCAR TOWNSEND Gen. Mang'r.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	8 00 a m	d5 25 a m
	1 05 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	8 00 a m	12 50 p m
	1 05 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.	3 25 p m	9 40 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

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Cleveland & Marietta Ry.

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	Depart.
No. 62, Accommodation.....	† 6 05 a m
No. 72, New York Express.....	* 8 10 a m
No. 72, Fast Pittsburgh Express.....	* 8 10 a m
No. 64, Fast Pittsburgh Express.....	* 3 00 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 68, New York Vestibule Limited.	* 8 30 p m
No. 70, Pittsburgh Local Express.....	*11 25 a m
No. 74, Pittsburgh & Youngst'n Ex...	†11 00 p m
	Arrive.
No. 65, Fast New York Express.....	*10 15 a m
No. 61, N. Y. & Pittsburgh Express...	* 7 15 a m
No. 71, Leavittsburg Local.....	† 2 10 p m
No. 67, Pittsburgh Express.....	*12 45 p m
No. 63, New York Express.....	* 6 50 p m
No. 63, Pittsburgh Express.....	* 6 50 p m
No. 69, Pittsburgh Local Express.....	† 9 10 p m
No. 73, Mantua Accommo.....	* 7 20 p m
No. 75, Pittsburgh & Youngst'n Ex...	† 2 55 a m

*Daily. †Daily, except Sunday.

Baggage checked through to all points East.

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BETWEEN

Toledo & Marietta.

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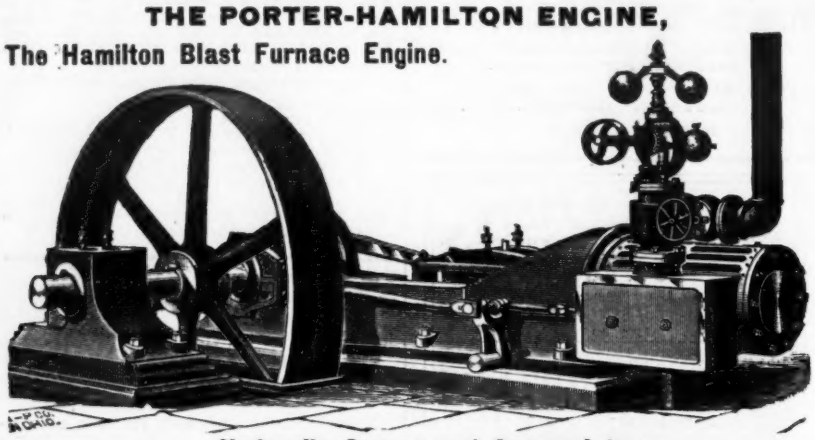

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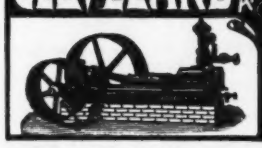

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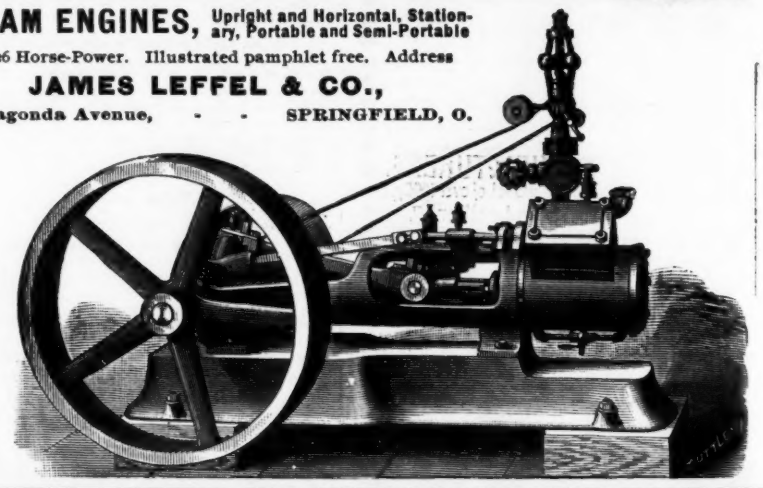

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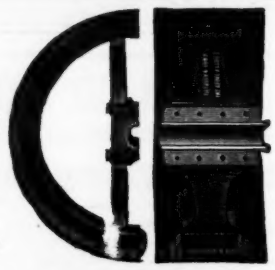

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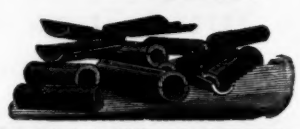

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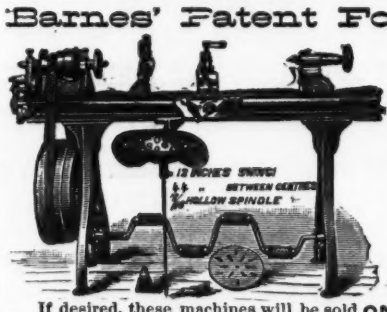

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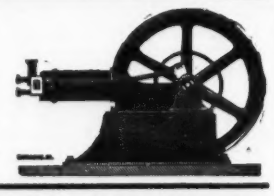

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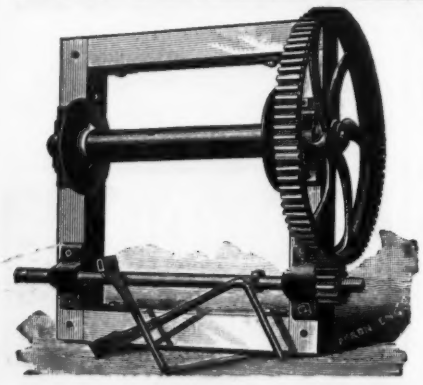

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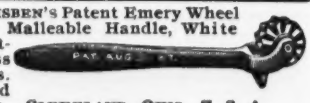

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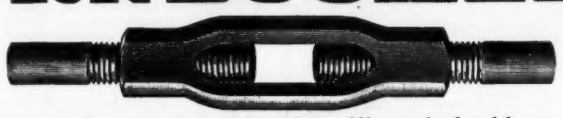

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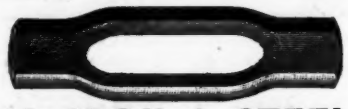

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PRESSED WROUGHT IRON OPEN TURN BUCKLES.

BEST AND CHEAPEST.

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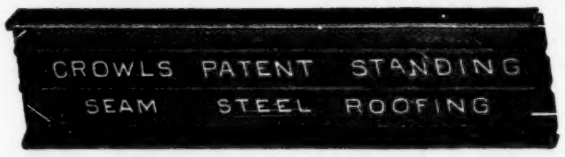

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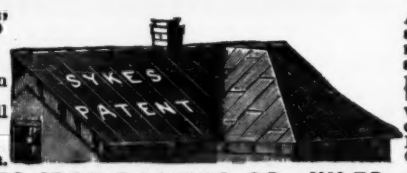

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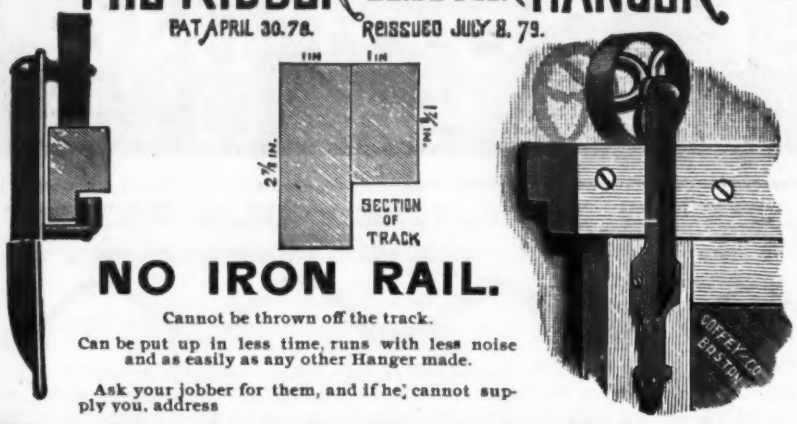

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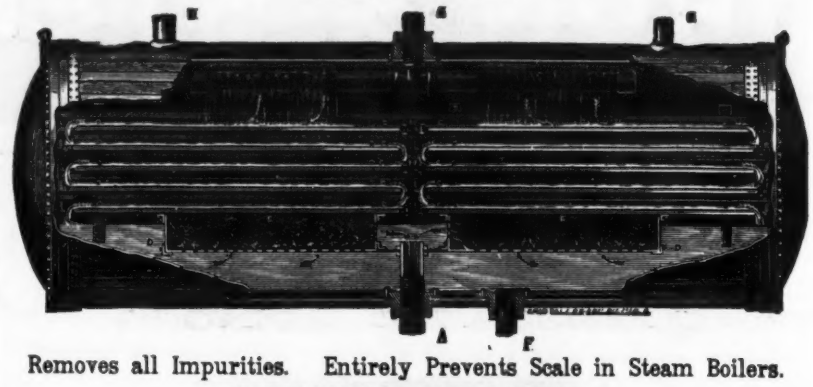

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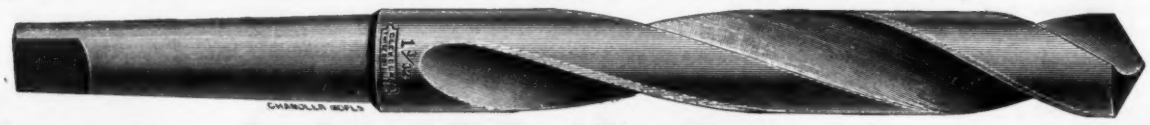

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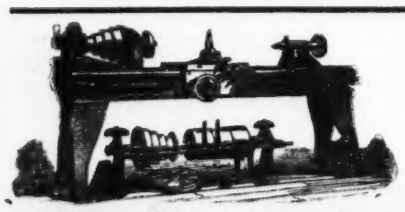

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